Route to:

Return to: JDP

INSTITUTE OF GAS TECHNOLOGY

THE GAS INDUSTRY'S OWN EDUCATIONAL AND RESEARCH FACILITY

CHICAGO 16, ILLINOIS

GAS ABSTRACTS

JULY, 1951

VOLUME 7, NUMBER 7

AFFILIATED WITH

ILLINOIS INSTITUTE OF TECHNOLOGY

CONTENTS

1. Gas Industry 105
2. Appliances 106
3. Combustion and Industrial Furnaces 107
4. Carbonization and Gasification 108
5. Natural Gas and Natural Gas Condensates 113
6. Petroleum and Synthetic Liquid Fuels 116
7. Analytical Methods and Tests 121
8. General and Physical Chemistry 123
9. Organic Chemistry 126
10. Chemical Engineering 127
11. Process Equipment and Instrumentation 130
12. Materials of Construction 131

GAS ABSTRACTS is published and distributed monthly by the Institute of Gas Technology, Chicago 16, Illinois. The contents of selected papers and patents are reviewed impartially by the editorial staff and material of potential interest to the Gas Industry is presented. Subscription rates to non-members of the Institute: $15.00 per year.—Printed in the U.S.A.

Copyright 1951 by the Institute of Gas Technology.

A special microfilm edition of Gas Abstracts can be supplied by University Microfilms, 313 N. First St., Ann Arbor, Michigan.

I. GAS INDUSTRY

British Gas Research

Smith, H. C. FUTURE OF EDUCATION AND RESEARCH, *Gas J.* (British) **266**, 364 (1951) May 9.

The status of the British Institution of Gas Engineers and the Gas Research Board in relation to the pooling of the Gas Council was reviewed. The former organization will probably continue as an independent professional group. However, withdrawal of the Gas Council's support of the Gas Research Board's research work, and the setting up of a series of Gas Council Research Centers will probably lead to the early dissolution of the Gas Research Board.

S. Katz

THE GAS RESEARCH BOARD WANES. *Gas J.* (British) **266**, 163-165, (1951) April 18.

After 12 years of accomplishment on the problems of the British gas industry, the Gas Research Board finds itself without financial support from the Gas Council which now governs the nationalized gas industry. While the Gas Council has been in the process of setting up a Research Committee and a similar research organization independent of the Department of Scientific and Industrial Research, there is much uncertainty as to the future transfer of the Board staff and the work has suffered. Chairman H. Hollings, now on the Gas Council Research Committee has resigned from the Gas Research Board.

O. P. Brysch

Expanding Industry

Casper, J. C. GAS: INDUSTRY GIANT. *Oil Gas J.*, **50**, 55-57 (1951) June 7.

The expansion of the natural gas industry is reviewed. An interesting comparative reserves figure is given. Proven reserves of liquid hydrocarbons including natural gas liquids amounts to 30 billion bbls. Natural gas reserves computed to an equivalent basis exceed this figure by one billion bbls.

J. D. Parent

Weeks, H. F. 57 NEW ENGLAND GAS PROPERTIES TELL PLANS FOR USE OF NATURAL GAS. *Am. Gas J.* **174**, 19-21 (1951) May.

This is a condensed report of a survey made to determine the manner of usage to be made of natural gas in New England. Fifty companies intend to use natural gas as base load and seven plan to use mixed gas. $9,000,000 is to be spent for peak-shaving and standby equipment. This auxiliary equipment will vary widely from one company to another.

J. D. Parent

63 MAJOR GAS COMPANIES WILL SPEND $254,490,975. *Gas* **27**, 31-34 (1951) May.

This is a survey of the expenditures proposed by 63 major gas companies for 1951. Pipeline companies plan to lay nearly 14,000 miles of transmission line and distribution companies plan to lay 850 miles of transmission line and nearly 4,000 miles of distribution mains. Cost is estimated at approximately $250,000,000.

J. D. Parent

Government Regulation

Farrar, L. D. ARE WE GOING TO HAVE A NEW NATIONAL FUEL POLICY? *Gas* **27**, 39-40 (1951) June.

A committee under the chairmanship of Sen. O'Mahoney is considering fuel reserves and the possible need of a national fuel policy. To date there is little outward evidence of anything beyond a fact-finding process. The author considers the adverse effect on the cost of living of limiting by end-use or any other factor the utilization of natural gas.

J. D. Parent

AGREE STATE CANNOT CONTROL GAS LINE LOCATION. *Public Utilities Fortnightly* **47**, 717 (1951) May 24.

Governor Lodge and House Majority Leader Shapiro agreed recently that the State of Connecticut does not have the power to control the location of natural gas pipelines. The state position is doubtful because of the possible conflict with the interstate Commerce clause of the United States Constitution. The state attorney general filed a dissenting opinion with Governor Lodge.

W. G. Bair

TENNESSEE GAS EXPANSION PROGRAM APPROVED BY FPC. *Oil Gas J.* **50**, 123 (1951) June 7.

Permission is sought to increase the daily capacity of the Tennessee Gas Transmission Co. Line from 1,310 MMcF to 1,395 MMcF. The added gas will be for Manufacturers Heat & Light Co., Iroquois Gas Corp., Equitable Gas Co. and United Natural Gas. The development of Hebron, Pa. storage field is included.

J. D. Parent

Heating Survey

Richmond, K. C. HOW THIS COUNTRY IS HEATED. *Coal-Heat*, **69**, 9, 11-13 (1951) May.

As of April 1, 1950, the Census of Housing reports 46,151,000 dwelling units, (not individual buildings) a gain of 8.5 million in 10 years. Of these, 21 million are heated by coal, 3.5 million by wood, 7.5 million by gas, 11.5 million by oil and 2.5 million by other fuels or unheated. From 1946 through 1950, 3,096,327 wood heating stoves and 2,883,486 coal heaters were purchased. It is believed that 10 million homes are heated by such stoves today and probably 4 million families cook with coal or wood. 3 million coal-fired warm-air furnaces and 2.4 million residential boilers (coal, oil and gas-fuel) were purchased since 1940, of which 4 to 5 million have gone into new buildings. In the same period 37 million space-heaters (not central heaters) were purchased. The AGA surveys show 7,217,224 househeating customers out of 19,747,558 total for gas on April 1, 1950. It is estimated that there were 7.5 million LP-gas installations on farms at the end of 1950.

O. P. Brysch

Rates

Hyde, W. J. Jr. MANAGEMENT'S DUAL RESPONSIBILITY FOR UTILITY RATES. *Public Utilities Fortnightly*, **47**, 531-535 (1951) April 26.

Management has duties to both investors and the consuming public. Utility representatives testified before Congress that a 6% return is necessary for financing essential construction. Earnings last year were below this figure and it now appears that it will be still lower, say 5.4%, this year.

J. D. Parent

Technical Training

Rushton, J. H. INDUSTRY PLEASED WITH CLASSROOMS. *Petroleum Refiner*, **30**, 77 (1951) May.

Humble has found that great benefits are derived by means of two forms of technical training for its refining research men and technologists. One is an advanced 10-week course for new technical employes which also serves as a refresher for some of the older ones. The other is a series of two-week courses taught by topflight professors of science and engineering, selected by the students themselves.

J. D. Parent

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Minchin, L. T. GAS AND ELECTRICITY IN DOUBLE HARNESS. p. 109

2. APPLIANCES

Burner Feed

Kleen, N. E. (assigned to Jet-Heet, Inc. THERMALLY ACTUATED PUMP. U.S. 2,553,817 (1951) May 22.

A thermal pump designed to deliver vaporized liquid fuel to the burner continuously is described. It is bicyclic, with the first period lasting from 6 to 60 seconds when the vaporized fuel is pumped to the burner; the second period lasting from 1 to 2 seconds when the fuel is replenished to the pump from the reservoirs.

S. Mori

Flame Stability

Wakelin, R. J. Herton, R. and Baldwin, R. R. STUDY OF THE FLAME STABILITY CHARACTERISTICS OF DIFFERENT VAPORIZED FUELS IN A SMALL SCALE COMBUSTION CHAMBER. *Fuel* **30**, 82-90 (1951) April.

The flame stability limits of a number of fuels have been studied. A small scale combustion chamber was used and the fuels were injected in vapor form to eliminate complications consequent on differing particle-size volatility when a liquid atomizer is used. Under these conditions the combustion has been found to be of the flame propagation type. Further, under certain conditions, the correlation has been found between flame stability and the static ignition limits of the fuel, and the interpretation of this is explained.

D. L. Nicols

3. COMBUSTION AND INDUSTRIAL FURNACES

Air Heaters

Byron, O. THE LATEST DEVELOPMENT IN THE USE OF AIR HEATERS. *Industrial Gas*, 29, 8-11, 30-32 (1951) May.

A survey is made of the recent progress in applying heat to various industrial processes by heated air. The effect of indirect and direct fired heaters on the work is discussed. Examples of applications are made for the paper industry, printing industry, textile industry, food industry, chemical industry, building material industry, can and metal container industry, television industry and the foundry industry.

D. L. Nicol

Air Pollution

Cosby, W. T. CHIMNEY EMISSIONS FROM COAL-BURNING APPLIANCES; PART TWO. *Coke and Gas* (British) 13, 163-166, (1951) May.

This second installment of the BCURA study of air pollution (see Gas Abstracts 7, 90, June 1951) reviews the research work on the combustion of tar vapor-air mixtures. Temperature and concentration limits of ignition are discussed. Effects of CO_2 and N_2 and of excess air upon formation of sooty flames are outlined, and the influence of overfire air, radiation, fuel-bed conditions and sulfur content are briefly considered.

O. P. Brysch

Kaiser, E. R. DUST EMISSION FROM COAL-FIRED BOILER FURNACES. *Combustion*, 22, 53 (1951) May.

A general theory of the behavior of small coal, ash and cinder particles in a boiler furnace is accompanied by a discussion of the basic factors affecting the emission of fly ash and cinders from stacks. These include coal-size, type of firing equipment, gas velocities, turbulence, dust collection and dust reinjection.

Author's Abstract

McCabe, L. C. ATMOSPHERIC POLLUTION. *Ind. Eng. Chem.* 43A, 87, 88, 90 (1951) May.

Reports from Detroit, Pittsburgh, and Cincinnati on their respective air pollution control programs during 1950 are briefly reviewed. The data presented indicates substantial progress in the reduction of soot, dustfall, and noxious gases. More reliable means for evaluation of the effectiveness of air pollution programs are being sought.

H. Hakewill

Combustion Research

RESEARCH ON SOLID FUELS. *Coke and Gas* (British) 13, 145, (1951) April.

The Annual Report of the British Coal Utilization Research Association for 1949 shows that the combustion department has been engaged in investigating the reactions in fuel beds, and deposits and corrosion in water-tube boilers. Physical research has included the construction of a sampler for dust in gases, and measurement of fine particles. Smokeless combustion and radiation from domestic burning appliances have also received attention. Industrial-scale research has been directed at improving the efficiency of large-scale furnaces and gas producers.

W. E. Ball

Flyash

Cobbs, W. H., Jr. USING POWDERED-COAL FLYASH. *Power* 95, 87, 88 (1951) May.

A literature survey has uncovered many uses for flyash. This low-cost ($0.67 per ton) material finds its principal use in concrete. Other important uses are as a fine filter in road asphalt, building block and brick. A bibliography of 70 references is appended.

W. E. Ball

Gas Turbine

Prince, D. C. (assigned to General Electric Company) GAS TURBINE POWER PLANT U.S. 2,547,660 (1951) April 3.

The invention relates to a gas turbine power unit having separate turbine rotors for air compression and load output so arranged that the starting motor supplies a minimum of power to bring the compressor rotor to idling speed.

C. v. Fredersdorff

Pressure Combustion

Mercier, E. (assigned to Moore, Inc.) EQUIPRESSURE VAPOR GENERATOR AND METHOD OF OPERATING SAME. U.S. 2,547,135 (1951) Apr. 3.

The invention relates to an automatically controlled vapor generator fired by pressure com-

bustion of fuel, arranged so that the combustion zone operates under approximately the same pressure as the vapor generating tubes. The principal advantage claimed is the maintenance of a minimum pressure difference between inside and outside of the heated tubes.

C. v. Fredersdorff

Pulverized Fuels

Dolezal, R. (assigned to Vitkovicke Zelezarny Klementa Gottwalda, N. P., Czechoslovakia) FURNACE FOR BURNING LOW-GRADE FUEL, INCLUDING AIR-COOLED PARTITION WALLS. U.S. 2,548,656 (1951) April 10.

The patent relates to a method of burning poor-grade coal dust in an air-cooled, forced-draft furnace, provided with a multiplicity of air-cooled partition walls with at least one coal burner located at the top of each wall. Combustion is downward through the flues between successive partitions, slagged coal ash being collected at the bottom of the furnace.

C. v. Fredersdorff

Hewitt, E. E. (assigned to The Westinghouse Air Brake Company) PULVERIZED COAL ATOMIZER. U.S. 2,545,518 (1951) Mar. 20

A variable orifice is described consisting of a fixed and a movable cylindrical element in a pipeline, adapted particularly for the explosive pulverization of granular materials such as coal.

C. v. Fredersdorff

Stephanoff, N. N. (assigned to C. H. Wheeler Manufacturing Co.) METHOD FOR TREATING FUEL. U.S. 2,550,390 (1951) April 24.

A method is presented for separating solid materials by passage of a gas-solids suspension through a plurality of nozzles into a centrifugal classifier or separating device.

C. v. Fredersdorff

Thermal Nitrogen Fixation

Daniels, F. (assigned to Wisconsin Alumni Research Foundation) THERMAL FIXATION OF ATMOSPHERIC NITROGEN. U.S. 2,548,002 (1951) April 10.

Production of NO by thermal fixation of nitrogen at 2000-2400° C is accomplished in two pebble stoves fired alternately by a centrally located combustion zone, the unit being arranged so that the reaction air is heated rapidly in the hot stove where nitrogen fixation occurs, passes through the combustion zone and then through the cold stove for rapid quenching to inhibit decomposition of the NO formed. Upon sufficient cooling of the hot stove, the cold stove is then heated by the combustion gases, and the second half of the cycle is started by passing the reaction air in the opposite direction.

C. v. Fredersdorff

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Richmond, K. C. HOW THIS COUNTRY IS HEATED. p. 106

Fleischer, K. W. GAS RADIANT HEATERS REVIVE INTEREST IN THERMAL CRACKING. p. 116

4. CARBONIZATION AND GASIFICATION

Carbonizing Equipment

Jenkins, D. A STUDY OF THE HEAT LOSSES FROM A COKE OVEN BATTERY. *Gas World* (British) 133, CS 46-50 (1951) May 5

Tests on a modern 76-oven battery fired with blast-furnace gas showed the heat losses to be distributed as follows: (1) hot coke, 37%; (2) hot coal gas, 26%; hot stack gas, 22%; radiation, 15%. Surface temperature measurements permitted the calculation of the following convection and radiation losses for a wind speed of 10 mph:

Oven top lids	5.7%
Oven lid seatings	6.8
Flue inspection covers	2.3
Flue top brickwork	6.5
Oven top brickwork	10.9
Oven doors	8.3
Buckstays, flue ends	15.8
Brickwork above doors	2.3
Regenerator ends	2.4
Ascension pipes	30.8
Arch pipes	8.3

W. E. Ball

Nelson, K. J. (assigned to Standard Oil Development Co.) FLUIDIZED CARBONIZATION. U.S. 2,549,117 (1951) April 17

The dense-phase fluidized-bed system is proposed for carbonization of coal, lignites, shales, oil residues. Improvements are claimed in sepa-

rating the entrained solids from the off-gases and volatiles, first, by adjusting the bed-level to maintaining higher heat-transfer from the bed to the cyclone separation zone to prevent condensation of volatiles, and second, by independently recirculating a portion of the bed-solids through the separation zone to exert a mechanical scrubbing action. O. P. Brysch

Coal Costs

WHAT'S AHEAD IN COAL MINING. *Coal Age* 56, 70-74 (1951) May 17.

Cost reduction is still the major problem, and higher productivity per man the answer, in the coal mining industry. Comparing 1930 and 1949, the tons/man-shift in bituminous strip mining increased from 13.92 to 15.33, in deep mining from 4.94 to 5.42, and the overall from 5.06 to 6.43. Increasing the tons/man is needed chiefly in the direct mining labor underground. This is possible by increased installation of continuous mining and transporting equipment. Auger mining, continuous mobile-loaders and face-planers seem likely to have important application in medium and thin level seams. New intermediate conveying units, main-line belts, larger cars, and dieselized track haulage offer great promise in increasing tons/man. Although application of these improved tools to pitch mining now is limited, several of them are being actively developed. O. P. Brysch

Coal Properties

Casamassima, G. and Meo, F. THE CARBONICATION OF OXIDIZED COALS. *Rivista dei Combustibili* (Italian), 5, 143-155 (1951) March.

The authors are examining the complex phenomenon of the oxidation of coal under the action of atmospheric oxygen, at ordinary temperatures and its influence on the process of coke-production. They used the Audibert and Delmas expandometer, modified by Cassan, to study the thermo-dilatometric behavior of coal at various stages of oxidation and of different granulometric distributions and they confirmed the fact that oxidation can destroy the coke-producing power of coal; the phenomenon is the more stressed the finer the coal. They found that the heat decomposes the superficial oxidized layer before the semi-melting and coal-expansion temperatures are reached, thus leaving between grains a layer of solid matter which prevents the coalescence, when the above temperature is reached for the non oxidized coal constituting the center of the original grain.

The lack of continuity from one grain to another favors the elimination of gases by opposing the expansion of the mass.

Due to their simplicity and sensitivity, the dilatometric tests can furnish very useful indirect indications on the degree of oxidation of coal. The authors consider the Jenkner method —which gives complete informations on the behavior of coal in the process of distillation— the best from a practical point of view.

Author's Abstract

Crentz, W. L., Steele, F. and Bailey, A. L. PREPARATION CHARACTERISTICS OF COAL OCCURING IN ARMSTRONG COUNTY, PA. *U. S. Bureau of Mines Report of Investigations* 4788 (1951) April.

This report is the third in a series appraising by counties the practicability of upgrading marginal deposits to metallurgical standard. In Armstrong County, Pa. the important reserves are in the Upper Freeport, Lower Freeport and Lower Kittaning beds. The raw coals are not considered to be of metallurgical grade since they usually contain from 2 to 4% sulfur. A study of the washing characteristics showed that the Freeport coals were responsive to fine crushing for release of sulfur impurities, but the Lower Kittaning was unaffected.

W. E. Ball

Electrical Carbonization

Minchin, L. T. GAS AND ELECTRICITY IN DOUBLE HARNESS. *Coke and Gas* (British) 13, 131 (1951) April.

Since the peak demand for electricity is hourly, and that for gas usually persists for longer periods, there may be advantages in producing peak load gas with off-peak electricity. Descriptions are given of the 30-ton carbonizing retort at Detroit Edison Co., the Tennessee Valley plant, and the more recent Norwegian installation. Either synthetic or fuel gas may be made in the latter apparatus. Recent design data indicates that power consumption may be drastically reduced in large installations.

W. E. Ball

Electrical Precipitators

Burton, J. E. (assigned to Budd Company) APPARATUS FOR CLEANING GASES. U.S. 2,547,902 (1951) April 3.

An electric precipitator is presented having automatic scrapers for cleaning the precipitated dust from the electrodes and a separate waste duct for intermittently discharging accumulated dust from the system.

C. v. Fredersdorff

Hedberg, C. W. (assigned to Research Corporation, ELECTRICAL PRECIPITATION APPARATUS. U.S. 2,554,247 (1951) May 22.

To prevent the carrying-out of dust, louvers are provided for shutting off the flow of gas to any of the several sections during the rapping operation. A built-in heat exchanger increases the pressure drop through the apparatus, and promotes better gas distribution.

W. E. Ball

Gas Production Trends

Townsend, F. S. GAS AND COKE PRODUCTION—PRESENT STATUS AND TREND. *Gas J.* (British) 266, 445 (1951) May 16.

In England, almost equal tonnages of coal are carbonized in coke ovens and gas works. The coking industry selects coals to obtain a strong coke, while the gas industry prefers a good thermal yield of gas. Further fuel economies appear to lie in the generation of high-pressure steam, both in waste-heat and works boilers. New developments include the methanization of water gas, and processes of complete gasification such as the Lurgi

W. E. Ball

King, J. G. TOWN G[illegible] FROM WEAKLY-CAKING COALS. *Gas* (British), 266, 446 (1951) May 16.

One method for utilizing weakly-caking coals is to blend them into the charge for present coking processes. A better answer is provided by the processes of: (1) static gasification in generators; (2) gasification in fluidized beds; (3) gasification in a gasifying medium. Semi-scale experiments justify a greatly expanded effort on the development of complete gasification under pressure. The high rates of gas production achieved with hydrogenation indicate this to be a key procedure for integration into new processes.

W. E. Ball

Gas Purification

Blohm, C. L., Riesenfeld, F. C. and Frazier, H. D. (assigned to The Fluor Corporation, Ltd.) EXTRACTION OF ACIDIC CONSTITUENTS FROM GASES. U.S. 2,550,446 (1951) April 24.

Gaseous mixtures containing impurities such as hydrogen sulfide, sulfur dioxide, and carbon dioxide are passed counter-current to a solution of amine, glycol and water to which organic diluents have been added. Monohydric alcohols, ethers of polyhydric alcohols, and aromatic and cyclic nitrogen bases are used as diluents to reduce the viscosity of the absorption solution. The use of a low viscosity absorbant provides operating advantages resulting in substantial reduction of plant costs. The absorbent is feed from hydrogen sulfide and carbon dioxide in a still, and the regenerated solution is reused to produce a treated gas containing less than one-tenth grain of hydrogen sulfide per 100 cubic feet of gas.

C. Hummel

BERGSTROEM TOWER REMOVES SULPHIDES AND MERCAPTANS. *Chem. Eng.* 58, 230 (1951) May.

Kraft mill evaporator and digester condensates are stripped of mercaptans and sulfides before disposal by counter-current contact with hot furnace gases (275-300° F.) in a wooden tower packed with tile rings. The tower is 75-85% efficient for sulfide removal and 60-70% efficient for mercaptan removal, and it is claimed that higher efficiencies may be obtained by using larger volumes of stripping gases.

H. Hakewill

Lurgi Gasification

Cooperman, J., Davis, J. D., Seymour, W. and Ruckes, W. L. LURGI PROCESS. *U.S. Bur. Mines Bull.* 498 (1951)

The Lurgi process of continuous pressure gasification of solid fuels with steam and oxygen was studied in a series of vertical gas generators of 4, 6 and 12″ diameter. Coking coals could not be used directly and low-temperature oxidation and high-temperature carbonization were studied to test methods of destruction of the coking properties. Subsequent gasification took place at pressures up to 445 psi and the gas usually contained 6 to 10% methane and between 0 and 1.0% ethane. A purification

train for the removal of CO_2, H_2S and organic sulfur under pressure is described, as well as a catalytic process for the synthesis of CO and H_2 to methane, also under pressure.

S. Katz

Modified Carbonization

Jones, W. I. RECENT DEVELOPMENTS IN THE THERMAL TREATMENT OF COALS. *J. Inst. Fuel* (British), 24, 69-75, (1951) March.

After a brief discussion of the chemical and physical structure of coal, consideration is given to phenomena attending heating such as plastic flow, swelling, softening temperature, and chemical changes. These processes are modified by oxidation, hydrogenation, rate of heating, and mineral matter content. In addition to coke, a wide range of solid carbon products, such as electrode carbon, active carbon, briquettes, and molded articles, can be made from coal.

W. E. Ball

Kramers, W. J. THE PREPARATION OF HIGHLY REACTIVE CHARS FROM COAL AND THEIR INTERACTION WITH SULPHUR. *J. Appl. Chem.* (British) 1, 189-195 (1951) May.

This paper describes the preparation from coal of carbonized briquettes which are highly reactive to sulphur and are promising as a substitute for wood charcoal in the manufacture of carbon disulphide. A description is given of the variables influencing the briquette carbonization process and the way in which they can be controlled to give products of very high reactivity. A comparison has been made of the rate of interaction of various carbons, including the chars, with sulphur and the results are discussed in relation to the factors influencing their reactivity.

Author's Abstract

Pound, G. S. THE DEVELOPMENT OF LOW-TEMPERATURE CARBONIZATION OF COAL. *J. Inst. Fuel* (British) 24, 61-68 (1951) March.

The general process and types of equipment used in low-temperature carbonization are described. Details are given of the Bolsover works, where batch carbonization is carried out in 5-in. tubes. Of particular interest is the complete description of refinery operations, where a large number of products are recovered, including fuel oil, creosote, pitch, petrol, diesel oil, the whole range of tar acids, and other specialized materials. Increasing attention is being given to the production of pure chemicals, including pure monohydric and dihydric phenols and various derivatives.

W. E. Ball

Puening, F. PROCESS FOR PREHEATING COAL FOR COKING. U.S. 2,552,014 (1951) May 8.

A stepwise process is provided for heating coal in vertical tubes by means of a current of hot gases. In the first stage, the coal is heated to 200° F.; hot coal at 350° F. is added, and the mixture is heated to 350° F. It is claimed that the process will reduce overheating in the outer layers of the coal, and prevent the agglomerating of wet, fine coal.

W. E. Ball

Oil Gas

Hall, E. L. SUMMARY OF HI-BTU OIL GAS PROGRESS SHOWS WIDE ADAPTABILITY ACHIEVED. *Am. Gas. J.*, 174, 23-26 (1951) May.

A review of the effects of oil properties, operating conditions, equipment type, and gas treatment on the gas quality and gas cost.

H. R. Linden

Producer Gas

West, F. J. and West, E. (assigned to West's Gas Improvement Company, Limited, England). GAS PRODUCER, INCLUDING ROTATABLE ASH BREAKING GRATE MEANS. U.S. 2,548,086 (1951) April 10.

Improvements in a gas producer are suggested, comprising a rotating grate in the form of a plurality of perforated portions of helical discs with their leading edges of curved shape and substantially radially disposed at the top of the grate, provision being made above the grate for preventing the ash from rotating thus allowing the leading grate edges to cut through the ash.

C. v. Fredersdorff

Reformed Gas

REGENERATIVE REFORM. *Chemical Week* 68, 23 (1951) June 2.

The first commercial Koppers-Hasche furnaces are now being constructed for Rochester Gas and Electric Corp., Rochester, N. Y. One mil-

lion CF/D of fuel gas will be produced by partial combustion of various types of hydrocarbon feedstocks. The apparatus comprises two regenerative furnaces of brick checkerwork, one preheating the entering gas-air mixture to 1600° F. to cause partial combustion, the other receiving the hot product gases and recovering their heat. The reversal of two 3-way valves at intervals reverses the direction of gas flow and the function of the two checkerworks. Gas which can be interchanged with natural gas can be made, with heating value ranging from 1000 BTU/CF downward.

O. P. Brysch

Shale Distillation

Dalin, D., Ronninge, S., Hedbäck, T. J., Gejrot, C. J. and Johansson, A. W (Sweden). METHOD OF AND APPARATUS FOR DRY DISTILLATION. U.S. 2,550,677 (1951) May 1.

The invention consists of a dry-distillation apparatus for shales, wood or coal particles, wherein fuel is fed downward through a vertical retort heated externally by the hot combustion gases rising from the fuel bed, upon which the degassed fuel discharging from the retort is deposited and burned. Distillation gases are collected from within the fuel space of the retort. The subatmospheric pressure of distillation gases is balanced by a pressure-control element against the pressure of the combustion gases in the combustion bed, and thereby controls the draft above the fuel bed. Temperatures within the combustion zone may be controlled by circulation of cooling fluid through an embedded duct. The inventors claim high rates of distillation without excessively high retort structures and without sintering in the fuel bed or waste of heat.

O. P. Brysch

Tar Products

Horne, D., Marshall, R. P. and Bondy, H. F. (assigned to Low Temperature Carbonisation Limited, London). RECOVERY OF TAR ACIDS FROM COAL OILS OR TARS. U.S. 2,550,814 (1951) May 1.

Acidification of caustic soda solution, used to remove tar acids from oils, with carbon dioxide at a pressure of 30 to 35 psi. is claimed to be more efficient than the conventional process at atmospheric pressure.

W. E. Ball

Myhill, A. R. THE CHARACTERISTICS OF ROAD TAR. *Coke and Gas* (British) **13**, 167-170, 183 (1951) May.

Some of the salient points are presented from the recently issued Bulletin No. 3, a summary of the cooperative research program begun in 1932 by the British Road Tar Association and the Department of Scientific and Industrial Research. Development of the original program has led to a comprehensive research scheme, which is graphically presented.

W. E. Ball

Underground Gasification

Brown, C. O. EQUIPMENT AND DESIGN. *Ind. Eng. Chem.* **43A**, 59-62 (1951) April.

A brief discussion is given on the technological and economic aspects of underground gasification. If underground gasification is to be entirely successful, methods must be devised for continuously contacting the coal with reactants along a definite gasification path, to gasify the coal as completely as possible, to prevent explosive pockets of oxygen and gas from forming and to limit undesirable caving-in of the gasification zone.

G. v. Fredersdorff

UNDERGROUND GASIFICATION. *J. Institute Fuel* (British), **24**, 94-99 (1951) May.

The work described is a large-scale extension of that carried out in 1947 at Gorgas. Recently, some 10,000 tons have been gasified, yielding a gas of up to 100 BTU. The prevention of bypassing remains as the basic difficulty of underground gasification. Rather than to attempt to produce a combustible gas, it has been found feasible to completely burn the coal underground, utilizing the products of combustion and their sensible heat in a gas turbine.

W. E. Ball

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Hasche, R. L. FURNACE. p. 116

Robinson, S. P. DESULFURIZATION OF GASES. p. 114

Saueressig, H. P. COOLING GAS TO THWART CORROSION. p. 128

SOUR GAS PINCH-HITS FOR BRIMSTONE p. 115

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Canadian Gas

Hancock, R. A. THE ALBERTA GAS SITUATION. *J. Petroleum Technology*, 3, 24 (1951) May.

This is a highly condensed summary of the gas situation in the Province of Alberta. Gas and oil bearing formations, land ownership and proposed pipelines are listed. The provincial government will not consider gas exportation until at least a thirty-year supply of gas is assured for the province. Estimates of reserves are 4 to 6 trillion cubic feet exclusive of the supply in the Peace River country.

J. D. Parent

Carbon Black

Loving, W. L. (assigned to Godfrey L. Cabot, Inc.) MANUFACTURE OF CARBON BLACK. U.S. 2,553,199 (1951) May 15.

The invention is concerned with production of high-grade furnace black from gas and oil. It was found that oil alone did not produce the desired black in the novel furnace described but that oil could be added to the natural gas without disturbing the quality of the product.

J. D. Parent

Stokes, C. A. FUEL ASPECTS OF CARBON BLACK MANUFACTURE. *J. Inst. Fuel* (British) 24, 90 (1951) March.

The factors involved in the production of carbon black from hydrocarbon and coal tar fuels are briefly discussed.

J. D. Parent

LP Gas

Howells, A. D. USE OF BUTANE. *Gas J.* (British), 266, 521-523 (1951) May 23.

At the Abergavenny Gas Undertaking (Wales), only five of the eight vertical retorts were in operating condition to meet an anticipated load of 400,000 cu.ft./day in December, 1950. A shortage of 100,000 cu.ft./day of 450 BTV/cu. ft. gas was met by utilizing producer gas enriched with butane. Up to 29% of gas mixture could be added. The cost of the butane was high, being obtained in 500 cu.ft. cylinders for the emergency operation.

C. H. Riesz

Manley, H. W. SNYDER GASOLINE PLANT DESIGNED TO PROCESS 70,000 MCF. OF GAS DAILY. *Oil Gas J.*, 49, 174-176, 179-192, (1951) April 19.

A description with flow diagram is given of the Snyder natural-gasoline plant in Scurry County, Texas. The plant is designed to process 70 MMCFD. Gas is gathered from high- and low-pressure field-separators in parallel 500 psig and 15 psig systems. Heating between the two-stage field separators is used. This permits delivery of gas at 15 psig to the low pressure system instead of the 0-5 psig usually used. This has resulted in a reduction in the size and tonnage of pipe required for the low pressure gathering system. Specially designed low-pressure blow-cases were installed in the low points of the low pressure system to gather drip gasoline. Gas from the high pressure system is used to "pressure" the drip gasoline to the top of the next hill through a separate drip condensate line. The drip gasoline is then put back into the low pressure system. Because of the richness of the gas, process stabilization of the rich oil at the 500 psig primary absorption pressure is used. The main absorber is a combined deethanizing absorber and has an absorption section and a stripping section with reboiler. The oil still and fractionation sections of the plant are conventional. In the interest of water economy, air-cooling is used for compressor lube-oil and jacket water, and for the still reflux and debutanizer condensers. All plant process-heating is accomplished by a hot oil system in order to reduce process steam requirements to a minimum.

O. T. Bloomer

Patterson, J. A. (assigned to Standard Oil Development Co.) FRACTIONATION OF LOW MOLECULAR WEIGHT COMPONENT MIXTURES. U.S. 2,552,451 (1951) May 8.

This invention relates to the fractionation of condensible gaseous mixtures at low temperatures. A double column with the two sections operating at different pressures and the use of expansion engines on one or more material streams are suggested for maximum economy.

J. D. Parent

Thomas, R. W. (assigned to Phillips Fetroleum Co.) PORTABLE LIQUEFIED GAS CONTAINER. U.S. 2,553,486 (1951) May 15.

The invention relates to a simplified self-service system for storage and the utilization of liquefied petroleum gases. The unit was designed for complete consumer operation where there is a light and seasonable load. The fusible metal insert, safety relief-valve and a push-pin operated tire-core valve are all incorporated into a tap-plug which screws into the container collar. The container is hung from the bottom of a regulator-bracket assembly and locked in place by the handle of the container.

O. T. Bloomer

Weber, G. L.P.G. MOTOR FUEL. *Oil Gas J.*, **50**, 69 (1951) May 17.

The fastest growing market for L.P.Gas is in motor fuel for industrial transportation. It is hoped that by increased substitution of L.P.G. our petroleum reserves may be saved. Optimists speak of increasing the life of petroleum reserves by fifty percent. L.P.G. reserves are high and almost equal gasoline reserves from petroleum. L.P.G. will be competitive with gasoline in most locations unless taxes are increased. L.P.G. will not usually favorably compete with Diesel fuels.

W. G. Bair

Pipelines

Eichelmann, J. F. and Quill, J. S. FEATURES OF A GAS TURBINE CENTRIFUGAL COMPRESSOR STATION FOR GAS PIPE LINE PUMPING. Paper, Am. Gas Assoc., Natural Gas Dept. Spring Meeting, Dallas, (1951) May; *Gas Age* **107**, 20-26 (1951) June 7; *Pipeline News*, **23**, 24-28 (1951) June.

The first large-scale installation of centrifugal compressors driven by gas turbines will be undertaken by El Paso Natural Gas Co. This report contains a discussion of design features of the compressor stations. A significant factor is that cooling water is not required except for lubricating oil. Another interesting feature is that about 25% more power will be generated in winter than in summer due to the lower ambient temperature.

J. D. Parent

Oates, J. F., Jr. THE STORY OF TEXAS ILLINOIS NATURAL GAS PIPELINE CO. NEW BIG-INCH SYSTEM—GULF COAST TO CHICAGO. Oil Gas J. **49**. 81, 82, 106-111 (1951) May 3.

This is a quite complete illustrated report on the planning and construction of the Texas-Illinois line.

J. D. Parent

Reid, R. O. OCEANOGRAPHIC CONSIDERATIONS IN MARINE PIPE LINE CONSTRUCTION. *Gas Age* **107**, 46-49, 106, 107

Problems attending construction of offshore pipelines are reviewed in some detail. Wave action, sag in unconsolidated sediments, bacterial action and mechanical deterioration of coating are some of the major problems.

J. D. Parent

Mason, A. D. THE PLANNING AND DESIGN OF HIGH-PRESSURE MAINS. *Gas Times* (British), **67**, 113, 115, 118 (1951) April 20

Some of the factors which were considered during the integration of the gas making operations in South Wales are described. The use of volumetric governing for controlling the supply of gas in bulk deliveries to towns and to installations being served is discussed. Holder storage and remote control are discussed.

B. E. Hunt

OVER $3¾ BILLION BUDGET FOR PIPELINE CONSTRUCTION IN 1951. *Gas* **27**, 95, 98, 99 (1951) May.

46 transmission companies plan to lay nearly 14,000 miles of line at a cost of about $786,000,000. Cost includes construction of compressor stations aggregating 736,275 hp.

J. D. Parent

Sour Gas Treatment

Robinson, S. P. (assigned to Phillips Petroleum Company) DESULFURIZATION OF GASES. U.S. 2,551,905 (1951) May 8.

A continuous process is claimed for desulfurizing hydrocarbon gases containing H_2S and organic sulfur compounds. The process is carried out in a three-chamber pebble heater apparatus. Heat-conducting catalytic pebbles, comprising a catalytic material and an oxide of a metal which accepts sulfur to form metal sulfide, are flowed by gravity through three vertically spaced chambers into the lowest or reaction chamber where they contact a stream

of sulfur-bearing feed gas raising its temperature to 400-900° F. and effecting desulfurization of the feed gas. The sulfurized pebbles are then elevated to the highest or regeneration chamber and contacted with air or air and steam at 750-1200° F. to convert metal sulfide on the pebble surfaces to metal oxides. Regenerated pebbles then pass into the middle or tempering chamber where the temperature is adjusted to the level desired in the reaction chamber.

H. Hakewill

NEW PLANT-INTEGRATED PROCESS. *Chem. Eng.* 58, 236 (1951) May.

The sour natural gas formerly wasted in the Poza Rica field is now piped 120 miles to Mexico City, as a two-purpose raw material for a new $10-million ammonium sulfate plant. The hydrogen sulfide scrubbed from the raw gas is recovered and burned to SO_2 and this passed a contact-process sulfuric acid unit to produce 200 tons acid per day. The purified natural gas together with air and steam is reformed into a 3 to 1 hydrogen-nitrogen mixture, which is converted by iron catalyst to 50 tons of ammonia per day. The ammonia and sulfuric acid are combined in a third unit to form 200 tons ammonium sulfate per day. This fertilizer, at a local cost of $41 per ton, replaces imports at $93 per ton, and permits a more widespread use by the farmers in boosting Mexican food production.

O. P. Brysch

"SOUR" GAS PINCH-HITS FOR BRIMSTONE. *Chem. Inds. Week*, 68, 22-24 (1951) May 19.

Within the last year construction has been started by several companies on at least seven new plants for the recovery of sulfur from petroleum-derived H_2S. Typical of such installations is that of the Stanolind Oil and Gas Company's natural gasoline plant at Elk Hills, Wyoming, which can recover 80 tons of sulfur per day. The ethanolamine process is employed for absorption and regeneration of acid gases. A portion of the H_2S-containing gas is burned to SO_2 and this, mixed with the original H_2S-gas, is reacted over a bauxite catalyst to form free sulfur. Liquid sulfur may be used to scrub sulfur vapor from the offgases, but generally the sulfur is recovered by condensation in a waste heat boiler. Establishment of such a plant for the sole purpose of sulfur recovery requires about 30 tons of sulfur per day to break even when operating on a natural gas containing 6-7% H_2S; whereas plant capacities as low as 5-6 tons/day are believed practicable in units integrated with natural gasoline plants.

H. Hakewill

Storage

Cullman, A. A. OPERATING ASPECTS OF GAS STORAGE ACCOUNTING. *Gas Age*, 107, 16, 17, 52, 53, (1951) June 7.

Some features of accounting for stored gas are discussed in a general way. No specific data or accounting procedures are given.

J. D. Parent

Davis, R. E. ECONOMICS OF NATURAL GAS STORAGE. *Gas*, 27, 103, 107-113 (1951) May.

This article deals largely with the history, development and economics of underground storage of natural gas in depleted oil or gas reservoirs. Other types of storage are briefly discussed and approximate costs of various types of holder presented. It is concluded that the holder type of storage is very expensive and its use limited to taking care of hourly or daily peaks, and in some cases for emergency needs. Important economic factors in underground storage which are briefly discussed include: reservoir deliverability characteristics, reservoir capacity, reservoir pressure, location of the reservoir to markets, minimum reservoir pressure limit, and effect of cushion gas on gas rates. The cost of underground storage of natural gas in most cases lies within the range of 5 to 20 cents per MCF of capacity. The author concludes, "that in the overall problem of conserving our natural resources for the most desirable uses, underground storage plays a large part that will become more important in the future, as the domestic space-heating market expands. ."

O. T. Bloomer

Meiller, D. V. and Markle, M. G. NATURAL GAS STORAGE. U.S. 2,550,844 (1951) May 1.

This patent refers to storage of natural gas at a pressure of about 2200 psi. Advantage is taken of the optimum compressibility factor in this region and the availability of seamless tubing which will stand this pressure. Storage

is for meeting seasonal or daily peak loads and is insurance against loss of supply during a line break.

J. D. Parent

IROQUOIS GAS PLANS STORAGE FACILITIES. *Pipe Line News*, 23, 61 (1951) May.

Iroquois Gas Corporation has proposed a $380,000 program to increase underground storage capacity. The company plans to add 10,000 new customers next winter.

J. D. Parent

STORAGE CALLED NUMBER ONE PROBLEM OF "UNBALANCED" LP-GAS INDUSTRY. *Natl. Petroleum News*, 43, 60, 61 (1951) May 23.

The author reviews the storage and transportation problems of the LP-Gas industry and the procedures employed to meet them. Storage in the space leached out of salt deposits seems especially attractive where large volumes are involved.

J. D. Parent

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Brooner, G. M. SELECTION OF TREATING PROCESSES FOR GASOLINE PLANTS. p. 116

Casper, J. C. GAS: INDUSTRY GIANT. p. 105

Schlesman, C. H. ELECTROCHEMICAL CONVERSION OF HYDROCARBONS. p. 126

TENNESSEE GAS EXPANSION PROGRAM APPROVED BY FPC. p. 106

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Cracking Processes

Fleischer, K. W. GAS RADIANT HEATERS REVIVE INTEREST IN THERMAL CRACKING. *Am. Gas J.* 174, 35, 36 (1951) May.

Application of radiant ceramic gas burners to petroleum processing operations is discussed. Typical processes are: thermal cracking, vis breaking and pyrolysis of light hydrocarbons at short residence times. Heat transfer rates up to 30,000 Btu per hour per square foot of tube surface are explained as a result of uniformly high temperatures of the radiating ceramic surfaces.

H. R. Linden

Hasche, R. L. (assigned to Eastman Kodak Co., Rochester, N.Y.) FURNACE. U.S. 2,552,277 (1951) May 8.

An apparatus useful for the pyrolitic decomposition of hydrocarbons is described. The apparatus consists of a combination of a first and a second regenerative furnace which are described in connection with their operation. Acetylene and/or ethylene are produced in the operation.

C. H. Riesz

Odell, W. W. (assigned to Standard Oil Development Co.) PROCESS FOR TREATING HYDROCARBON SYNTHESIS TAIL GAS. U.S. 2,554,264 (1951) May 22.

Tail gases produced in the synthesis of hydrocarbons from carbon monoxide and hydrogen are passed to a pebble-type heater where the pebbles comprise combustible carbon such as coke, and where interaction between carbon dioxide in the tail gases and the carbon pebbles take place at 1600-1800° F. to form carbon monoxide.

C. H. Riesz

Shimp, H. G. (assigned to Houdry Process Corporation) METHOD OF CATALYTIC CRACKING OF HYDROCARBONS UTILIZING A MOVING CATALYST BED. U.S. 2,550,727 (1951) May 1.

Catalytic cracking by means of a moving catalyst bed process of the T.C.C. type is improved by introducing the feed at a temperature in the range 850-1050° F. and in a concurrent flow direction with the moving catalyst. The temperature is further set to provide the feed stream with a greater heat capacity than the catalyst stream although not more than twice as great. Improved octane numbers or yields of gasoline can be obtained.

C. H. Riesz

Desulfurization

Brooner, G. M. THE SELECTION OF TREATING PROCESSES FOR GASOLINE PLANTS. *Petroleum Refiner*, 30, 95-99 (1951) April

Treatment of propane, butane and natural gasoline in a gasoline plant consists in the removal of hydrogen sulfide and free sulfur and either the removal or conversion of mercaptan sulfur. Well established methods for gasoline treating are discussed.

C. H. Riesz

Kalichevsky, V. A. SWEETENING AND DESULFURIZATION OF LIGHT PETROLEUM PRODUCTS. PART VI. ALKALINE REAGENTS. *Petroleum Refiner*, 30, 111-118 (1951) April.

Alkaline reagents, such as sodium hydroxide, potassium hydroxide, ammonia, lime and alkaline solutions with solubility promoters, are extensively used to remove acidic sulfur compounds from refinery products. Recognition of the oxidation-inhibiting properties of phenolic compounds naturally present and normally removed by alkaline reagents has induced modifications of the processes. Processes using solubility promoters such as potassium isobutyrate (Solutizer), tannin (Tannin-Solutizer), tar acids (Mercapsol) and methyl alcohol (Unisol) are the most recent developments. The bibliography includes more than 220 references, almost all of which are patents.

C. H. Riesz

Kalichevsky, V. A. SWEETENING AND DESULFURIZATION OF LIGHT PETROLEUM PRODUCTS: PART VII. VAPOR PHASE DESULFURIZATION, *Petroleum Refiner*, 30, 117-122, (1951) May.

The instability of many sulfur compounds (petroleum mercaptans and sulfides particularly) at elevated temperatures makes the treatment in the vapor phase quite useful in sweetening. Reaction of S with metals or metal oxides and cleavage of H_2S permit sulfur removal before the decomposition of hydrocarbon compounds. Substances useful in vapor phase treatment (including those used with clay adsorbents for gum removal) are tabulated by patent number. Combinations with hydrogenation processes are discussed. A 92-item bibliography is included.

O. P. Brysch

Kalichevsky, V. A. SWEETENING AND DESULFURIZATION OF LIGHT PETROLEUM PRODUCTS. PART VIII — MISCELLANEOUS DESULFURIZATION PROCESS. *Petroleum Refiner*, 30, 135-137, (1951) June.

A listing is made of the many solvents and chemicals patented for the desulfurization of light petroleum distillates. Percolation through solid adsorbents is also reviewed. A bibliography of 23 items is given. This paper concludes the series on the subject of sweetening and desulfurization of light petroleum products. (For Parts I to V see *Gas Abstracts*: 6, 229 (1950); 7, 11, 28, 61 and 76 (1951); for Parts VI and VII, see this issue).

C. H. Riesz

Seebold, J. E. (assigned to Standard Oil Company.) MERCAPTAN REMOVAL FROM HYDROCARBONS. U.S. 2,550,091 (1951) April 24.

Hydrocarbon charging stocks containing mercaptans are purified by extraction with aqueous solutions of caustic bases and lower aliphatic alcohols. The alcohol and mercaptans are removed from the caustic solution in a stripper by means of a reboiler. Fractional distillation of the mercaptan-contaminated alcohol in the presence of an oxidizing gas stream produces a purified alcohol for recycling.

C. E. Hummel

Voreck, W. E. Jr., Carroll, W. C. and Zurcher, P. EXTRACTION OF MERCAPTANS BY MEANS OF ADSORPTION. *Petroleum Refiner*, 30, 126-129, (1951) *March*.

Mercaptans are removed from light petroleum products by percolation through a bed of active carbon impregnated with sodium hydroxide. The absorbent is regenerated by blowing with steam and air. Mercaptan-free sodium hydroxide, released from the carbon during regeneration, can be used for impregnation and for washing of raw feed.

C. E. Hummel

Fischer-Tropsch Catalysts

Atwell, H. V. (assigned to The Texas Company) METHOD OF EFFECTING CATALYTIC CONVERSION. U.S. 2,553,398 (1951) May 15.

In a synthesis of hydrocarbons from carbon monoxide and hydrogen, the catalyst is suspended as a fine powder, preferably below 270 mesh in the feed gas, while an inert relatively coarse material, 40 to 80 mesh, is maintained as a fluidized mass in a reaction zone equipped with heat exchange surface. The effluent containing suspended catalyst is divided into two streams, one of which contains the reaction products while the other is used to recycle the catalyst to the reaction zone.

C. H. Riesz

Beck, R. A., Sensel, E. E. and Millendorf, A. J. (assigned to The Texas Company) PREPARATION AND USE OF SYNTHESIS CATALYSTS. U.S. 2,550,442 (1951) April 24.

Improved cobalt or nickel-type catalysts for the synthesis of hydrocarbons from carbon monoxide and hydrogen are obtained by use of ammonium carbonate for precipitation of the metal. This avoids introduction of alkali which even in trace quantities has been found detrimental to the activity of these catalysts.

C. H. Riesz

Buchmann, F. J. and Voorhies, A., Jr. (assigned to Standard Oil Development Co.) LOW-PRESSURE HYDROCARBON SYNTHESIS PROCESS. U.S. 2,552,308 (1951) May 8.

A promoted iron catalyst supported on activated carbon (80-90% by weight) provides improved conversion of carbon monoxide and hydrogen into liquid hydrocarbon products. The catalyst is effective for one-pass conversion of synthesis gases prepared by oxidizing natural gas with air. The hydrogen-to-carbon monoxide ratio is set at about 2-to-1 in such synthesis gases and provides olefinic products.

C. H. Riesz

Gillespie, B. G. (assigned to Standard Oil Development Company) HYDROCARBON SYNTHESIS. U.S. 2,552,422 (1951) May 8.

In the fluidized synthesis of products from carbon monoxide and hydrogen, extended induction periods for powdered, reduced, promoted, sintered iron catalysts can be minimized by incorporation of finely divided carbon in amounts varying from 2 to 10% by weight of the iron.

C. H. Riesz

Kimberlin, C. N., Jr. (assigned To Standard Oil Development Company) HYDROCARBON SYNTHESIS CATALYST. U.S. 2,550,416 (1951) April 24.

A powdered iron catalyst adapted for use in the synthesis of hydrocarbons from carbon monoxide and hydrogen is prepared by bonding iron oxide with an alkali metal silicate, e.g. 1 to 10% by weight of sodium silicate.

C. H. Riesz

Kimberlin, C. N., Jr. (assigned to Standard Oil Development Co.) PROCESS OF DRYING HYDROGEL MICROSPHERES. U.S. 2,552,-323 (1951) May 8.

A gel catalyst, such as silica-alumina, is formed into microspheres (1 millimeter diameter or less). Following washing, the material is formed into an aqueous slurry and subjected to a freezing and thawing operation. Compressive stresses harden the microspheres and prevent agglomeration.

C. H. Riesz

Kirshenbaum, I. and Kearby, K. K. (assigned to Standard Oil Development Co.) HYDROCARBON SYNTHESIS CATALYST. U.S. 2,553,415 (1951) May 15.

Catalysts for the synthesis of hydrocarbons from carbon monoxide and hydrogen are comprised of a major portion (60-95% by weight) of calcium or barium carbonates and a minor proportion (5-40%) of ferrous carbonate.

C. H. Riesz

Mills, G. A. (assigned to Houdry Process Corporation) HYDROCARBON CONVERSION. U.S. 2,552,573 (1951) May 15.

The deactivating influence of steam upon cracking catalysts is counteracted by allowing a substantial amount of coke to be retained on the catalyst after regeneration. This deposit should be in excess of 15 grams of carbon per liter of catalyst.

C. H. Riesz

Segura, M. A. (assigned to Standard Oil Development Company) HYDROCARBON SYNTHESIS. U.S. 2,552,347 (1951) May 8.

An improved iron catalyst is claimed for the synthesis of products from carbon monoxide and hydrogen. The catalyst comprises a major proportion of iron, from 2 to 8% by weight of vanadium and a small proportion of an alkali metal compound, e.g. 2.5% of potassium fluoride.

C. H. Riesz

Slater, W. L. Jr. (assigned to the Texas Company) ADDITION OF A DESICCANT TO A FLUIDIZED IRON REDUCTION PROCESS. U.S. 2,550,609 (1951) April 24

After reducing about 80% of the metal content of catalysts for the synthesis of hydrocarbons from carbon monoxide and hydrogen, solid dessicant, e.g. calcium carbide, is added to effect

removal of water and improve the subsequent reduction.

C. H. Riesz

Vesterdal, H. G. (assigned to Standard Oil Development Company, Delaware) SYNTHESIS OF HYDROCARBONS. U.S. 2,553,433 (1951) May 15.

A catalyst for the hydrogenation of carbon monoxide comprises a major proportion of iron oxide and minor amounts of an alkali promoter and copper chromite. A suitable composition is 90% of Fe_2O_3 (99%) activated with K_2CO_3 (1%), and 10% of $CuCr_2O_3$.

C. H. Riesz

Weck, H. I., Meyerson S. and Seelig, H. S. HYDROCARBON SYNTHESIS CATALYST STUDIES. USE OF DEUTEROCHLORIC ACID. *J. Am. Chem. Soc.* 73, 2331-2333 (1951) May.

It was demonstrated that the hydrocarbons liberated by treatment of an iron synthesis catalyst with deuterochloric acid are derived from iron carbide and acid and are not adsorbed synthetic products.

C. H. Riesz

Iranian Oil

Duff, D. M. OPTIMISM IN IRAN. *Oil Gas J.*, 50, 65 (1951) June 7.

Anglo-Iranian Oil Company has informed the Iranian Government that it will send representatives to Teheran for "full and frank discussions" on the future of its properties. Britain appears willing to concede some form of nationalization of the Iranian oil properties, although it insists that the issue must be settled by negotiation and be "otherwise satisfactory." Advance royalty payments by Anglo-Iranian has been stopped in the meantime. Negotiations in other Middle Eastern countries are continuing pending the arrangements made in Iran. U.S. oil companies have completed a foreign-supply plan to go into effect in the event of a break in Middle East oil supplies.

C. H. Riesz

IRAN'S BEST BET: BRITAIN *World Oil* 132, 257-258 (1951) June.

Russian control of the Middle East would result in the loss of oil to the Western Powers. However, the military advantage to Russia would otherwise be slight since the oil would have to be transported across the Caspian Sea, overland pipelines being difficult to construct in the mountains of northern Iran. Anglo-Iranian is the only group which has the ships and the markets to absorb 500,000 barrels per day of refined products from Abadan.

C. H. Riesz

Oil Storage

STORE OIL IN AN UNUSED MINE? *Chem. Eng.* 58, 238-243 (1951) May.

An old feldspar mine is being used in Sweden for oil storage at a cost of one seventh of that required for underground tank storage.

J. D. Parent

Petroleum Production

Maly, J. W. and Morton, T. E. SELECTION AND EVALUATION OF WELLS FOR HYDRAFAC TREATMENT. *Oil Gas J.* 49, 126-128 (1951) May 3.

This article emphasizes the fact that the relative success resulting from hydraulic-fracture treatment of a well is largely dependent upon the consideration and evaluation of the available information on the well. Among the factors to be considered in deciding whether or not hydraulic-fracture treatment is applicable to a particular well are permeability, reservoir energy, production history, workover history, physical formation characteristics, conditions of well equipment, and individual problems. The importance of each of these factors is discussed generally.

J. J. Guyer

Ralph, H. D. NEW RECOVERY TOOL. *Oil Gas J.* 49, 53-54 (1951) May.

The use of carbon dioxide in water-flood operations is discussed. Tests made by Oil Recovery Corp. on prepared sea sand, cores, and in the field have shown that a 25% carbonated water at 800 psi produces the best results, in terms of oil recovery and carbon dioxide economy. The field tests indicate increased injectivity of the oil sands; increased production of organic acids or their salts; and corrosion inhibition, as a result of the buffer action of carbonates and bicarbonates formed. As much as 75% of the carbon dioxide can be recovered and reused. The solids deposited present no plugging prob-

lem. Some of the limiting factors are pressure, temperature of the flood water, concentration of carbon dioxide, nature of the crude oil, and natural-gas content of the crude. These field tests have been confined to sandstone reservoirs.

J. J. Guyer

Refinery Growth

Duff, D. M. REFINING JUMP, *Oil Gas J.* 50, 78, 81-85 (1951) May 17.

More than 550,000 bbl./day of oil refining capacity was added during 1950 in countries outside the United States and exclusive of Russia and communist-dominated countries. The increases and projected expansions in 1951, 1952 and 1953 are analyzed by countries.

C. H. Riesz

Reforming Catalysts

Allen, J. G. (assigned to Phillips Petroleum Company). CATALYST REGENERATION PROCESS. U.S. 2,552,659 (1951) May 15.

Carbonaceous deposits adhering to finely-divided catalyst particles are removed by forming a slurry with oil, water or other solvents. The slurry is injected into a combustion zone at the point of combustion; rapid burning takes place at a temperature of from 2000° to 3500° F., instantly vaporizing the slurry but without damage to the catalyst effectiveness for subsequent re-use.

C. H. Riesz

Bond, G. R. Jr. (assigned to Houdry Process Corp.) ACID-TREATED CLAY CATALYST FOR CRACKING HYDROCARBONS. U.S. 2,551,580 (1951) May 8.

Sub-bentonite montmorillonite clays are converted into cracking catalysts by extensive acid activation to remove impurities such as iron. The alumina content removed incidental to activation is replaced by impregnating clay-residue pellets with an aqueous solution of an aluminum salt in an amount sufficient to deposit 5% by weight of alumina.

C. H. Riesz

Clapetta, F. G. and Hills, L. (assigned to The Atlantic Refining Company) REFORMING PROCESS AND CATALYST THEREFOR. U.S. 2,550,531 (1951) April 24.

Conversion reforming of gasoline fractions into products containing higher quantities of aromatics and isomers is accomplished by contact with hydrogen at temperatures of 600 to 1000°F in the presence of a platinum catalyst. The catalyst is prepared by impregnating a silica-aluminum cracking catalyst with 0.01 to 2.5% by weight of platinum (e.g. 0.25%). The silica-alumina base is steamed before impregnation to reduce the surface area to the range of 10 to 65 square meters per gram (e.g. 45) to obtain best catalyst performance.

C. H. Riesz

Corner, E. S. and Lynch, C. S. (assigned to Standard Oil Development Co.) OXIDATION CARRIER FOR THE OXIDATION OF HYDROCARBONS. U.S. 2,553,551 (1951) May 22.

Normally gaseous hydrocarbons are oxidized to carbon monoxide and hydrogen by means of an oxygen carrier comprising equal parts by weight of iron oxide (Fe_2O_3) and manganese oxide (MnO_2). Operations employing fluidized solids techniques are suggested.

C. H. Riesz

Kimberlin, C. N. and Bilisoly, J. P. (assigned to Standard Oil Development Co.) PREPARATION OF CATALYSTS CONTAINING SILICA AND ALUMINA OR MAGNESIA OR BOTH. U.S. 2,551,014 (1951) May 1.

Cracking catalysts are prepared by adding an aqueous magnesia to an acidic silica hydrogel, the proportions and acidity being such as to form a neutral product. The product is converted to a hydrogel and is washed, dried and finally activated at a temperature in the range of 850° to 1400° F. An alternative form of catalyst is prepared by impregnating the silica hydrogel with an aluminum salt and results in a silica-alumina-magnesia catalyst by the specified method.

C. H. Riesz

Kimberlin, C. N. and Bilisoly, J. P. (assigned to Standard Oil Development Company) PREPARATION OF CATALYSTS CONTAINING SILICA AND A METAL OXIDE AND WITH OR WITHOUT MAGNESIA. U.S. 2,551,015 (1951) May 1.

Cracking catalysts are prepared by impregnating a silica hydrosol with the salt of a metal characterized by an ability to form a hydrous oxide upon addition of magnesia to the acidic silica hydrosol. Some 11 three-component catalysts are cited in the examples.

C. H. Riesz

Shale Oil

Thompson, W. L. (assigned to Standard Oil Development Co.) "PROCESS FOR RECOVERY OF HYDROCARBON OIL FROM SHALE". U.S. 2,550,432 (1951) April 24.

The invention applies the "fluid-solids" technique to the continuous recovery of oils from shale or from tar sands. The oil is driven from the suspended sand as volatile vapors by heat supplied by the admixture of hot spent sand from a "fluidized" combustion unit, and the coke-coated particles are recycled to this unit. Steam is generated by heat exchange with the spent hot sand.

O. P. Brysch

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Berl, E. "PRODUCTION OF VALUABLE ORGANIC COMPOUNDS FROM PLANT MATERIAL." p. 126

Hall, E. L. "SUMMARY OF HI-BTU OIL GAS PROGRESS SHOWS WIDE ADAPTABILITY ACHIEVED." p. 111

Loving, W. L. "MANUFACTURE OF CARBON BLACK." p. 113

Nord, M. "HOW TO CALCULATE DISTILLATIONS WITH VARIABLE RELATIVE VOLATILITY." p. 127

Widell, T. and Juhasz, I. "SOFTENING TEMPERATURES OF RESIDUAL FUEL OIL ASH." p. 122

7. ANALYTICAL METHODS AND TESTS

Distillation Analysis

Podbielniak, W. J. PRECISE FRACTIONAL DISTILLATION ANALYSIS. *Petroleum Refiner* 30, 85-92 (1951) April.

The satisfactory operation of light hydrocarbon processing plants is closely related to the convenience and accuracy of the means available for analyzing the compositions of the various charge, product, and intermediate process streams. This article explains some of the factors that influence the choice of methods and equipment for gas analysis by low-temperature fractional distillation. Published here for the first time, it was presented some years ago before a meeting of the Petroleum Division of the American Chemical Society at Atlantic City. This article should be useful to many plant men since it includes both a discussion of theoretical considerations for analysis by low-temperature fractional distillation, and charts for the users of such apparatus.

Author's Abstract

Gas Analysis

Harris, F. E. and Nash, L. K. DETERMINATION OF TRACES OF WATER VAPOR IN GASES. *Anal. Chem.* 23, 736-739 (1951) May.

A general method for the trace determination of water vapor in condensable gases, particularly hydrocarbon gases, has been sought. The novel method here described is based on measurement, with a thermistor bridge, of the temperature rise produced when a stream of the test gas is passed over solid calcium hydride. The apparatus is readily assembled from normally available components, calibration is easily accomplished with a dynamic blending system, and a single determination requires but 15 minutes. The measurement is unaffected by (or readily compensated for) wide and rapid fluctuations in the composition of the matrix gas, and the method may be used for the determination of 0.001 to 0.1 volume % of water vapor. Water determinations formerly accomplished with difficulty can be conducted by this method; and the thermistor bridge technique should find important application in a number of analogous trace determinations based on thermometric measurements.

Author's Abstract

Moses, D. V. and Brumbaugh, J. W. (assigned to E. I. du Pont de Nemours & Co.) AUTOMATIC GAS ANALYZER. U.S. 2,551,281 (1951) May 1.

An instrument is claimed for determining and recording intermittently the concentration of H_2S or other reactive gas by passage through a chemically impregnated tape and subsequent measurement of the light reflectance of the exposed tape.

H. Hakewill

Gas Sampling

McEvoy, J. E. (assigned to Bailey Meter Company) GAS SAMPLING DEVICE. U.S. 2,550,-933 (1951) May 1.

An improved gas sampling device, particularly designed for taking samples of combustion gases, is claimed. Means are provided for withdrawing gas sample from a furnace or kiln through a tube into which water is directed in a stream opposite to the flow of gases to effect the removal of dust from the gas before subjecting it to analysis and to eliminate the formation of mud plugs in the sampling tube.

H. Hakewill

Oil Ash

Widell, T. and Juhász, I. SOFTENING TEMPERATURES OF RESIDUAL FUEL-OIL ASH. *Combustion*, 22, 51 (1951) May.

Deposits of vanadium pentoxide and alkali-sulfates formed on superheaters would indicate that the softening point of these constituents is higher than their mixtures. Softening-point determinations of synthetic mixtures of V_2O_5 and the alkalies were made. The softening point of sodium sulfate mixtures is 150 to 200° F lower than the melting point of pure V_2O_5. For mixtures of potassium sulfate and V_2O_5, the value is 300 to 400° F lower.

C. L. Tsaros

Spectrometric Methods

Frederickson, L. D., Jr. and Smith, L. SPECTROGRAPHIC DETERMINATION OF NITROGEN IN SOME ORGANIC NITROGEN COMPOUNDS. *Anal. Chem.* 23, 742-744 (1951) May.

Crystalline organic compounds are analysed for nitrogen by coating them on carbon electrodes, and sparking their electrodes in a CO_2 atmosphere. The 3883.6 Angstrom cyanogen band head-intensity is proportional to the concentration of nitrogen present. Accuracy to ± 2% is claimed. Application to gas analysis is suggested.

Ivan Ladany

Hofer, L. J. and Peebles, W. C. X-RAY DIFFRACTION PATTERNS OF SOLID AROMATIC HYDROCARBONS. *Anal. Chem.* 23, 690-695 (1951) May.

For the positive identification of solid crystalline aromatic hydrocarbons, x-ray diffraction analysis is proposed. X-ray powder diffraction patterns of 59 hydrocarbons have been obtained using iron-target radiation. Impurities sufficient to lower the melting point by as much as 15° C. do not appreciably modify the diffraction patterns. The patterns are very characteristic; those of closely related compounds and even isomers are unique and can be readily identified.

Author's Abstract

Levine, S. W. and Okamoto, A. H. DETERMINATION OF SULFUR IN PETROLEUM FRACTIONS BY X-RAY ABSORPTION. *Anal. Chem.* 23, 699-704 (1951) May.

A method is presented for total sulfur analysis in a base having insignificant or known amounts of contaminants. The equipment consists of a Geiger counter X-ray spectrometer; a set of polystyrene rods are used to obtain the necessary density corrections. Accuracy is ± 0.02% sulfur. The same method is also applicable to other analytical problems.

Ivan Ladany

Steam Purity

Rivers, H. M. (assigned to Hall Laboratories) METHOD AND APPARATUS FOR EFFECTING SELF-REGULATED PARTIAL CONDENSATION OF CONDENSABLE VAPORS. U.S. 2,549,117 (1951) April 17.

A method and apparatus for determining the solid and gas content of an impure steam sample is described. In general, the sample is cooled in a heat exchange with the gas-occluded condensed steam fraction as the coolant. Part of the steam containing all of the solids is condensed, while the gas-occluded steam is left in a vapor phase during the separation of the two. The latter is then condensed for use as the

coolant mentioned above. This results in keeping the steam content of the two fractions at a constant ratio. The two fractions are analyzed using the specific conductivity or other analystical method.

S. Mori

Viscometer

Fay, C. H. VISCOSITY METER. (assigned to Shell Development Co.) U.S. 2,550,052 (1951) April 24.

The viscosity of a fluid held in a sealed container under predetermined pressure and temperature conditions may be electrically measured with this apparatus. A cylindrical magnet immersed in the fluid is oscillated at constant amplitude by the interaction of its field with the oscillating field of an adjacent coil. The power input to the coil is a measure of the damping due to the viscosity of the fluid.

W. E. Ball

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Brown, R. A. COMPOUND TYPES IN GASOLINE BY MASS SPECTROMETER ANALYSIS. p. 125

Delahay, P. A POLAROGRAPHIC METHOD FOR THE CONTINUOUS DETERMINATION OF THE CONSUMPTION OF OXYGEN IN CORROSION TESTS. p. 132

Doolittle, A. K., and Peterson, R. H. PREPARATION AND PHYSICAL PROPERTIES OF A SERIES OF N-ALKANES. p. 127

Farr, W. H., Fagen, W. F., and Kolanowski, S. C. DETECTION OF TOXIC GASES, PARTICULARLY CARBON MONOXIDE. p. 130

Gorman, J. G., Jones, E. J., and Hipple, J. A. ANALYSIS OF SOLIDS WITH THE MASS SPECTROMETER. p. 125

Kehn, G. R., and Wilhelm, E. B. CURRENT REQUIREMENTS FOR THE CATHODIC PROTECTION OF STEEL IN DELUTE AQUEOUS SOLUTIONS. p. 131

Klug, C. W. GAS DETECTION APPARATUS. p. 130

Kniebes, D. V., Katz, S., and Bernstein, R. B. MASS SPECTROMETER RESOLUTION OF JON PAIRS OF SIMILAR M/E. p. 125

dePiccolellis, J. CONTINUOUS GAS ANALYZER SERVES HIGH-PRESSURE STACK. p. 130

Snell, D. S. and Morrison, E. B. MINIMIZING HYDROGEN LEAKAGE IN HYDROGEN-COOLED MACHINES. p. 130

Solowy, S. REFERENCE STANDARD FOR MASS SPECTROMETRIC ANALYSIS OF NITROGEN. p. 125

8. GENERAL AND PHYSICAL CHEMISTRY

Adsorption—Area Research

Barrett, E. P. and Joyner, L. G. DETERMINATION OF NITROGEN ADSORPTION-DESORPTION ISOTHERMS. *Anal. Chem.* 23, 791, 792 (1951) May

Experiments showed that it is unwise to attempt to determine total pore-volume of adsorbents possessing a considerable volume of large pores by adsorption-desorption isotherms. The use of the oxygen thermometer appeared to introduce greater errors than obtained with the nitrogen thermometer. The use of relative pressures of 0.97 for pore-volume measurement, as suggested by Innes, is suitable for isotherms of types I, IV or V, but not of types II or III. The failure to achieve saturation gives erroneous results at high relative pressures, and may lead to erroneous desorption isotherms. To provide assurance that saturation has been accomplished prior to desorption of types II and III, total pore volume should be measured by density determination.

W. E. Ball

Dodd, C.G., Davis, J. W. and Pidgeon, F. D. MEASUREMENT OF SPECIFIC SURFACE AREAS OF NONPOROUS POWDERS BY A PRESSURE-DECLINE LIQUID-PERMEABILITY METHOD. *J. Phys. and Colloid Chem.* 55, 684-698 (1951) May

The pressure-decline technique has some advantages over the constant-head technique usually used. Two types of apparatus are described, one for high rates of flow through coarse powders, the other for fine powders in the subsieve size range. Results obtained with a 70- to 100-mesh sample of glass spheres showed good agreement with microscopic meas-

urements. A quartz powder of ~7 microns presented some anomalies which require further investigation. W. E. Ball

Fu, Y. and Bartell, F. E. SURFACE AREA OF POROUS ADSORBENTS. *J. Phys. and Colloid Chem.* 55, 662 (1951) May.

A method for the determination of the specific area of porous solids is described, in which the dimensions of the adsorbate molecule are not involved. The method shows good agreement with the B.E.T. method. The theory of the procedure is presented and none of the criticism, notably the necessity for more experimental points than required by the B.E.T. determination. S. Katz

Innes, W. B. APPARATUS AND PROCEDURE FOR RAPID AUTOMATIC ADSORPTION, SURFACE AREA, AND PORE VOLUME MEASUREMENT. *Anal. Chem.* 23, 759-763 (1951) May.

Modification of the conventional Brunnauer-Emmett-Teller method made possible the determination of surface area in less than 15 minutes working time. In the new apparatus, gas is not added in increments, but is introduced at a slow, constant rate. Surface area is calculated from the time required to reach a relative pressure end-point of 0.2, the time being automatically indicated by a modified Bourdon gage. For pore-volume measurement, a relative pressure of 0.97 is used, with desorption being measured through a wet testmeter. Check determinations showed an average deviation from the mean of 1.2%. Surface area results can be expected to be within 5% of those obtained by the regular method. W. E. Ball

Jones, D. C. and Birks, E. W. THE ADSORPTION ISOTHERM OF LANGMUIR AND OF BRUNAUER, EMMETT, AND TELLER FOR MULTILAYERS WHERE n IS 2. *J. Chem. Soc.* (British) 1127-1132 (1951) April.

The adsorption isotherms of Langmuir and of Brunauer, Emmett and Teller are analyzed for the case where adsorption of two layers occurs. Where the ratio of the relative lines on the first and second layers is 4, the isotherm is a rectangular hyperbola, of the same form as that given by Langmuir for the monolayer equation. S. Katz

Thomas, A. M. MOISTURE PERMEABILITY, DIFFUSION AND SORPTION IN ORGANIC FILM-FORMING MATERIALS. *J. Applied Chem.* (British), 1, 141-157 (1951) April.

The experimental results showed that sorption of water vapor is a function only of the relative humidity, and is independent of temperature; also, that the heat sorption at a given temperature is the same as the heat of liquifaction. The sorption-relative humidity curves agreed with multi-molecular absorption equations of Brunauer, Emmett and Teller up to about 90% relative humidity. It was concluded that moisture sorption is a result of hydrogen bond formation between the water molecules and hydrophilic radicals in the molecules of the solid plus van der Waal's forces. Derivations of the B.E.T. equations for multimolecular absorption and for the free energy of sorption are given in the appendix. W. E. Ball

Ammonia Catalysts

Souby, A. M. and Schiller, J. C. (assigned to Standard Oil Development Company) PROCESS FOR PRODUCING AMMONIA. U.S. 2,550,389 (1951) April 24.

A catalyst for the synthesis of ammonia from nitrogen and hydrogen at low temperatures (350-600°F) and low pressures (0-1000 psig) comprises a mixture of the sulfides of nickel and tungsten. C. H. Riesz

Electron Diffraction

IDENTIFICATION AND CRYSTAL HABIT OF CHROMIUM CARBIDE, $Cr_{23}C_6$, AS DETERMINED BY ELECTRON DIFFRACTION. *Nature*, (British) 167, 728 (1951) May 5.

Residues obtained by electrolytic extraction of 25-20 chromium-nickel steels were examined by electron diffraction. The face-centered cubic crystal structure presented a regular hexagonal cross-grating pattern with a spacing of 7.5 Angstroms. C. H. Riesz

Hydrides

Lesesne, S. D. (assigned to Allied Process Corporation, New York) METHOD OF AND AP-

PARATUS FOR THE PRODUCTION OF BORON HYDRIDES. U.S. 2,553,198 (1951) May 15.

Diborane is prepared in 90% yields by the interaction of lthium hydride and a boron halide. The reaction takes place upon heating the dry reactants, or suspending them in a nonaqueous solvent such as an ester, ketone, or ether.

C. A. Berg

Spectrometric Studies

Brown, R. A. COMPOUND TYPES IN GASOLINE BY MASS SPECTROMETER ANALYSIS. *Anal. Chem.* **23**, 430-437 (1951) March.

Application of the mass spectrometer to the determination of compound types in complex hydrocarbon mixtures is described and operating procedures are given in detail. The analytical data may be obtained on total paraffins, total cycloparaffins with mono-olefins, aromatics, and the compound group comprising cyclomono-olefins, diolefins, and acetylenes. Accuracies are of the order of 2-4%. The application of the method to other hydrocarbon systems, and non-hydrocarbon systems is considered.

S. Katz

Gorman, J. G., Jones, E. J. and Hipple, J. A. ANALYSIS OF SOLIDS WITH THE MASS SPECTROMETER. *Anal. Chem.* **23**, 438-440 (1951) March.

A procedure is described for the introduction of metallic solids into the analytical mass spectrometer by spark excitation. The results for some ferrous alloys show very good agreement with the known compositions.

S. Katz

Kniebes, D. V., Katz, S. and Bernstein, R. B. MASS SPECTROMETER RESOLUTION OF ION PAIRS OF SIMILAR m/e. *J. Chem. Phys.* **19**, 654 (1951) May.

The limits of mass resolution of the Consolidated Engineering Corp. mass spectrometer were determined. Twelve resolved ion pairs are shown, and several unresolved pairs are noted. Valuable applications to analytical techniques are apparent.

D. V. Kniebes

Solowy, S. REFERENCE STANDARD FOR MASS SPECTROMETRIC ANALYSIS OF NITROGEN. *Anal. Chem.* **23**, 386, 387 (1951) February.

Fieser's solution is used to remove oxygen from air to provide a nitrogen sample having a constant atom percent of N^{15}.

D. V. Kniebes

Ribaud, G. and Doncescu, A. ABSORPTION OF INFRA-RED RAYS BY DIVERSE SUBSTANCES IN THE LIQUID STATE. (ABSORPTION DU RAYONNEMENT, INFRAROUGE PAR DIVERSES SUBSTANCES A L'ETÁT LIQUIDE.) J. Usines Gaz (French) **75**, 162-173 (1951) June.

A detailed description is given of studies of absorption of infra-red radiation, with special reference to drying of paint coatings. Data are presented graphically for the total absorption of different wavelengths from a 400° C source for water and phenolic, glycero-phthalic, cellulosic and poly-vinyl resin films of 0.05 mm thickness. Solvents such as acetone, xylene, benzine and turpentine were measured also. Data for different film thicknesses, and source temperatures are plotted. The relationship of penetration and wavelength upon clear and pigmented films is discussed.

O. P. Brysch

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Frederickson, L. D. J., and Smith, L. "SPECTROGRAPHIC DETERMINATION OF NITROGEN IN SOME ORGANIC NITROGEN COMPOUNDS." p. 122

Hofer, L. J. and Peebles, W. C. "X-RAY DIFFRACTION PATTERNS OF SOLID AROMATIC HYDROCARBONS." p. 122

Levine, S. W. and Okamoto, A. H. "DETERMINATION OF SULFUR IN PETROLEUM FRACTION BY X-RAY ABSORPTION." p. 122

9. ORGANIC CHEMISTRY

Acetylene

Schlesman, C. H. (assigned to Socony-Vacuum Oil Company, Incorporated, New York) ELECTROCHEMICAL CONVERSION OF HYDROCARBONS. U.S. 2,553,944 (1951) May 22.

Acetylene is produced in a reaction zone where not only is a stream of natural gas continuously subjected to an ionizing electrical field to provide an ionic discharge but also to a succession of pulses of relatively high intensity but of short duration, one to ten microseconds.

C. H. Riesz

Anhydride Synthesis

Gresham, W. F. and Brooks, R. E. (assigned to E. I. duPont de Nemours & Co.) ANHYDRIDE SYNTHESIS. U.S. 2,549,453 (1951) April 17.

The invention contemplates the synthesis of acid anhydrides from carbon monoxide, water and an olefinic compound, by heating above 110° C at superatmospheric pressures in the presence of nickel or cobalt catalysts and carboxylic acids. Propionic anhydride is cited as an example, prepared from CO, water, ethylene and propionic acid. The method is an extension of the Reppe synthesis.

O. Brysch

Aromatics Production

Teter, J. W. (assigned to Sinclair Refining Company) AZEOTROPIC DISTILLATION OF NAPHTHALENES. U.S. 2,551,912 (1951) May 8.

To separate naphthalene and alkylated naphthalenes from non-aromatic hydrocarbon, benzonitrile is added, and the mixture fractionated. The non-aromatics and benzonitrile are distilled off as an azeotrope, leaving a residue of naphthalene and homologs. Naphthalene may be crystallized from the residue by cooling.

W. E. Ball

ATLAS BREAKS GROUND FOR BENZENE-PRODUCTION UNITS. *Oil Gas J.* **50**, 138 (1951) May 31.

Atlas Processing Co. has begun the construction of a $3,300,000 benzene plant, comprising platforming and extractive-distillation units at Shreveport, La. Gasoline will be piped from Carthage, Texas. This is the second local benzene project, as Shell Oil announced such construction a week earlier.

O. P. Brysch

Bitumen Synthesis

Berl, E., (Berl, W. G., executor) PRODUCTION OF VALUABLE ORGANIC COMPOUNDS FROM PLANT MATERIAL. U.S. 2,551,579 (1951) May 8.

Plant substances are heated in a closed system at temperatures in the range of 302° to 698° F. with water and ammonium hydrosulfide. Semiliquid bitumen-like partly aliphatic and partly cyclic compounds containing a major portion of carbon and minor portions of sulfur, nitrogen, oxygen and hydrogen are obtained.

C. H. Riesz

Carbonyl Reactions

Johnson, W. A. and Skrimshire, G. E. THE MEERWEIN - PONNDORFF - OPPENAUER REACTION. *Chem. and Ind.* (British) 380-384, (1951) May 19.

Meerwein-Ponndorff reduction and Oppenauer oxidation are complementary reactions constituting a reversible transformation between carbonyl and hydroxyl compounds in the presence of metallic (usually aluminum) alkoxide. General principles involved in these two reactions are discussed. The chief use of the Oppenauer process has been in the steroid series.

C. H. Riesz

Cyanogen Products

Powers, R. E. (assigned to Koppers Company, Inc.) PREPARATION OF THIOUREA. U.S. 2,552,584 (1951) May 15.

This invention embodies several improvements in the process for manufacture of thiocyanate. It was found that the yield was increased by carrying out the final extraction of the conversion mixture with water obtained by the melting of ice in contact with undissolved solute.

W. E. Ball

FIBERS SPUR CYANIDE BOOM. *Chem. Inds.*, 68, 41, 42 (1951) May 12.

The cyanide industry (hydrogen cyanide, sodium cyanide and calcium cyanide) is expected to double in 1951 and redouble in 1952, chiefly

because of new synthetic fibers. The increase in production will be provided by plants reacting natural gas and ammonia to form hydrogen cyanide and hydrogen.

C. H. Riesz

Ethylene Products

Heider, R. L. (assigned to Monsanto Chemical Co.) ETHYLENE OXIDE PROCESS AND CATALYST THEREFOR. U.S. 2,554,459 (1951) May 22.

Fused beryllium oxide comprises an effective carrier for silver catalyst used in the direct combination of ethylene and oxygen. The beryllia carrier is more temperature-resistant than the alumina or silica based carriers conventionally employed.

C. H. Riesz

Swaminathan, V. S. I. C. I. WILTON WORKS TO MAKE PETROLEUM-DERIVED TERYLENE. *Oil Gas J.*, 50, 86, 87, 111 (1951) June 7.

Terylene (du Pont Fiber V) is a high molecular-weight polyester produced by the interesterification of terephthalic acid and ethylene glycol. The terephthalic acid is prepared by oxidizing paraxylene; the ethylene used in ethylene glycol manufacture will be obtained from refining gases. Some 5000 tons/year of yarn and staple fiber will be produced.

C. H. Riesz

Paraffins

Doolittle, A. K. and Peterson, R. H. PREPARATION AND PHYSICAL PROPERTIES OF A SERIES OF N-ALKANES. *J. Am. Chem. Soc.* 73, 2145-2151 (1951) May.

Ten normal paraffin hydrocarbons ranging from n-pentane (C_5H_{12}) to n-tetrahexacontane ($C_{64}H_{130}$) were prepared and selected physical properties determined. The viscosities were measured with high precision.

C. H. Riesz

Petrochemicals

Weber, G. PETROCHEMICALS IN THE SOUTHWEST. *Oil Gas J.* 49, 112-117, 124, 125 (1951) May 3.

Petrochemicals produced in 51 plants by 43 companies located in the Southwest are listed and discussed.

C. H. Riesz

10. CHEMICAL ENGINEERING

Desorption

Hachmuth, K. H. (assigned to Phillips Petroleum Co.) MEANS AND METHOD FOR SELECTIVE LOW-PRESSURE DESORPTION OF LIQUIDS. U.S. 2,549,968 (1951) April 24.

A method of low pressure desorption is described wherein the gas-rich absorption liquid is passed through a conduit of gradually decreasing cross-section, thus converting pressure-head to velocity-head. The issuing liquid strikes the wall of the rotating desorption chamber and spreads out in a thin film as it runs down the wall. The lean liquid leaves the wall, enters a liquid outlet conduit in which the velocity-head is converted to pressure-head, and returns to the absorber. The optimum speed of shell rotation is that corresponding to the velocity of liquid flow from the inlet conduit. Proper design of the volute (conduit) is necessary to minimize turbulence.

C. L. Tsaros

Distillation Calculations

Nord, M. HOW TO CALCULATE DISTILLATIONS WITH VARIABLE RELATIVE VOLATILITY. *Chem. Eng.* 58, 144-146 (1951) February.

Methods of calculating distillations with variable relative-volatility are presented. Included are equations for ideal, non-ideal non-azeotropic, and non-ideal azeotropic systems; equations for simple batch distillations; and a nomograph for solving simple batch distillations where there is variable relative-volatility.

J. J. Guyer

Fluid Friction-Loss

Forest, E. M. PIPE FLUID FLOW FRICTION LOSS DETERMINATION. *Petroleum Refiner* 30, 97-106 (1951) March.

The data of Pigott and Kemler for the turbulent flow of fluids is used to prepare a correlation of fluid flow pressure-loss with viscosity. By means of three charts constructed by the author, and knowing the flow rate of a fluid with known kinematic viscosity, the pressure loss may be calculated.

B. E. Hunt

Gas-Solids Contact

Degnen, W. J. and Hill, L. R. (assigned to The M. W. Kellogg Company) CONTACTING GASES AND SOLIDS. U.S. 2,548,875 (1951) April 17.

A method for contacting gases in a fluidized bed of solids, the spent gases being withdrawn through a plurality of porous thimbles in the lean-phase space of the reaction vessel.

C. v. Fredersdorff

Drew, R. D. (assigned to Socony-Vacuum Oil Co., Inc.) PROCESS FOR HEATING SOLID GRANULES. U.S. 2,548,522 (1951) April 10.

A process is described for heating granular solids by introducing fuel and air into a moving bed of compact solids and providing for adequate fuel-air mixing and complete combustion. The solids are fed into the top of an insulated vessel, down past distribution plates, baffles composed of criss-crossed invented angles, and a final set of distributor plates. Steam is fed between the bottom distributor plates to purge residual gases from the solids. The fuel and air are introduced above the bottom distribution plate and partial combustion takes place with the gases in intimate contact with the compact solids. The rising gases pass through baffles made of inverted angles with chimneys, where mixing takes place with little heat exchange between gases and solids. The mixed gases are reintroduced to the compact solids and then drawn off to an externally located combustion chamber, where combustion is continued without heat loss to the solids. The hot gases are fed back into the compact solids above the combustion chamber take-off, and are withdrawn as exhaust gases below the top distribution plate. Comparative runs indicated a great reduction of combustible exhaust gases as a result of this process of mixing and external combustion.

J. J. Guyer

Evans, L. P. (assigned to Socony-Vacuum Oil Company) METHOD AND APPARATUS FOR CONTACTING GASES WITH PARTICLE FORM SOLID MATERIAL. U.S. 2,546,634 (1951) March 27.

A catalytic reactor is described consisting of four stages or chambers with a system of conduits passing through the vessel from a feed chamber, which permits flow of catalyst to the four reaction chambers and a similar system permits the flow of catalyst from the chambers down to a spent-catalyst bin. Gas is fed in parellel to each chamber through inlet-riser conduits and taken out the same way. Operation of the system is described.

C. L. Tsaros

Gas Cooling

Saueressig, H. P. COOLING GAS TO THWART CORROSION. *Compressed Air*, 56, 115-118 (1951) May.

Because of stoppages in various regulators and meters by iron-oxide dust resulting from corrosion, the Honolulu Gas Co. installed a water-vapor refrigerating unit to chill cooling water to a temperature of 45° F. that will permit cooling the gas to 55° F. The vapor refrigerator cools water from 61° F. to 45° F., using 2030 lb/hr. of 5 psig. exhaust steam from the gas compresser to maintain the evaporation vacuum. In addition, 200 lbs/hr. of steam at 140 psig. is used to remove incondensibles. 75 gpm. of water is handled in the system.

C. L. Tsaros

Grain Size Separation

Gustavsson, K. A. (Sweden) METHOD AND APPARATUS FOR DIVIDING PULVEROUS MATERIAL INTO DESIRED FRACTIONS BY MEANS OF A ROTATING SIFTING MACHINE. U.S. 2,546,068 (1951) March 20.

The patent relates to an air separator for dividing granular materials into large and small particle fractions, comprising a chamber having inside rotating discs and means for introducing air and granular solids at the center of the device.

W. E. Ball

Liquid Heating and Cooling

Heiss, J. F. and Coull, J. NOMOGRAPH OF DITTUS-BOELTER EQUATION FOR HEATING AND COOLING LIQUIDS. *Ind. Eng. Chem.* 43, 1226-1228 (1951) May.

The Dittus-Boelter equation was first set up as two simplified equations expressing the coefficient, h, as a function dependent on physical properties. One equation is for heating and one for cooling. For 22 nonviscous substances the heating and cooling functions can be expressed as straight-line semi-logarithmic plots.

For each substance X and Y coordinates are used as the nomograph in conjunction with the fluid velocity and pipe diameter to give the desired answer.

C. L. Tsaros

Oxygen Production

Jenny, F. J. and Scheibel, E. G. (assigned to Hydrocarbon Research, Inc.) METHOD OF PRODUCING OXYGEN. U.S. 2,552,561 (1951) May 15.

This process for producing oxygen by the liquefaction and rectification of air comprises passing a stream of air at 70 to 85 psig through three 3-path heat exchangers. The first and third of these are reversible through compound reversing valves so that moisture and CO_2 may be successively removed. The moisture-free air from the first exchanger may be cooled by refrigeration or expansion of about 10% of the crude O_2 and N_2 streams between the second and third exchangers to remove CO_2, after which it passes to the high-pressure stage of a 2-stage rectification system. The expanded N_2 stream also cools the N_2 and O_2 which are used as reflux to the low-pressure stage. The inventor claims substantially complete removal of moisture and CO_2, with a minimized volume loss and dilution of both the air and the nitrogen streams upon each reversal.

O. P. Brysch

Sponge Iron Processes

Cavanagh, P. E. SPONGE IRON A REMEDY FOR SCRAP SHORTAGE? *Steel*, 128, 92, 95, 98, 101 (1951) June 11.

Pilot-scale tests conducted on the tunnel-kiln sponge-iron process brought out the potentialities of this process in making a scrap substitute. The oxide is packed in fine coke in suitable containers, heated at 2000° F. for the required reduction time while passing through a brick kiln, and then cooled. Development work reduced the time of treatment to as low as 36 hours. Production costs were estimated at $43 to $46 per ton of 90% reduced sponge. A study of all commercially operating sponge-iron processes indicated that the Wiberg-Sodorfors is ordinarily the most efficient and economical.

W. E. Ball

Water-Gas Regulated Annealing

Hancock, P. F. and Schulte, F. W. K. (assigned to Birlec, Ltd., England) DECARBURIZATION OF IRON OR IRON ALLOY CASTINGS. U.S. 2,557,379 (1951) June 19.

The proposed process of decarburization and annealing of iron is designed to make self-regulating the present known processes using carbon-air-steam reactions. The carbon of a charge of iron castings reacts with the available oxygen in a closed furnace space at 850 to 1100° C. The gaseous mixture containing CO and CO_2 is circulated from the furnace, the excess gas vented and burned in a boiler to generate steam, which is introduced into the circulating gas system and returned to the decarburizing chamber. Here the steam enters the water-gas reaction with the carbon, and if steam plant efficiency is maintained at 17%, the CO/CO_2 ratio is maintained at 3 to 1, which provides the maximum decarburizing power without causing oxidation of the castings.

O. P. Brysch

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Burton, J. E. "APPARATUS FOR CLEANING GASES." p. 110

Hedburg, C. W. "ELECTRICAL PRECIPITATION APPARATUS." p. 110

Powers, R. E. "PREPARATION OF THIOUREA." p. 126

Swaminathan, V. S. "I C. I. WALTON WORKS TO MAKE PETROLEUM-DERIVED TERYLENE." p. 127

Teter, J. W. "AZEOTROPIC DISTILLATION OF NAPHTHALENES." p. 126

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Carbon Monoxide Detector

Farr, W. H., Fagen, W. F. and Kolanowski, S. C. (assigned to Stewart-Warner Corp.) DETECTION OF TOXIC GASES, PARTICULARLY CARBON MONOXIDE. U.S. 2,553,179, (1951) May 15.

A device combining photoelectric and electronic elements for actuating an alarm and control system in the presence of dangerous concentrations of carbon monoxide in the atmosphere is claimed. A colorimetric CO indicating gel developed by the National Bureau of Standards is utilized as the substance which is responsive to the presence of CO.

H. Hakewill

Klug, C. W. (assigned to Stewart-Warner Corp.) GAS DETECTION APPARATUS. U.S. 2,549,974 (1951) April 24.

A new improved gas detection apparatus is claimed, which is capable of operating controlling or warning devices upon detection of such a gas as carbon monoxide. This instrument utilizes a photosensitive mechanism activated by the color change from yellow to dark blue-green when CO contacts NBS colorimetric carbon monoxide indicating gel. Ozone or oxides of nitrogen are employed to restore the gel to its initial yelow color after each use.

H. Hakewill

Continuous Gas Analyzer

de Piccolellis, J. CONTINUOUS GAS ANALYZER SERVES HIGH-PRESSURE STACK. *Steel* **128**, 136, 138 (1951) May 7.

A continuous gas analyzer, that gives a dependable performance on a blast furnace floor with a minimum amount of maintenance is developed. It is a thermal conductivity type. The paper also discusses the correlations based on gas equilibria that would give advance indication of the heating and cooling cycles of the furnace fire or six hours before the trend became evident in the hot metal analysis.

M. C. Miyaji

Electrolysis Meter

Ringer, F. TAKING CORROSION MEASUREMENTS. *Petroleum Engr.* **23D**, 115, 116, 119, 120 (1951) May.

This article describes an electrolysis meter and a vacuum-tube voltmeter which have proven useful as field instruments for obtaining various corrosion measurements. Operating instructions are given for making various measurements. A parts list for the electrolysis meter and the vacuum tube voltmeter is given.

B. E. Hunt

Hydrogen Leakage Detector

Snell, D. S. and Morrison, E. B. MINIMIZING HYDROGEN LEAKAGE IN HYDROGEN-COOLED MACHINES. *Power Eng.* **55**, 56-62 (1951) May.

The problem of leakage is discussed for various types of hydrogen-cooled electric machines. Of particular interest are the various types of detectors used and their applicabilities to various leaks. The article also discusses a way of estimating the loss of hydrogen in CF/D at 30 in. Hg and 60° F. if the temperature and pressure drop changes are known for a given interval of time.

S. Mori

Mechanized Correlation Studies

Leckie, D. S. STATISTICAL ANALYSIS OF BLAST FURNACE PRODUCTION DATA. *J. Metals*, 3, 443, 444 (1951) June.

Selected variables affecting blast furnace performance were analyzed by the methods of multiple correlation and analysis of variance. Much time was saved by transferring the data to punched cards, which were utilized in International Business Machines equipment for the automatic calculation of sums of squares and products. The simultaneous equations were solved on the Consolidated Computer, and correlation coefficients computed on automatic calculators. Seventy-two percent of the variation in production was accounted for. It was indicated that an increase of 1 psi. in top pressure increased iron production 19 tons per day, and decreased the coke rate 48 lb. per ton of iron.

W. E. Ball

Powder Feeder

Tyrner, J. M. (assigned to Air Reduction Company, Inc.) APPARATUS FOR FEEDING

POWDERED MATERIAL. U.S. 2,549,033 (1951) April 17.

A portable vibratory device is described particularly adapted for small-scale feeding of finely-divided solids into a gas stream, comprising a pressure-equalized hopper, sieve, electric vibrator, feeding chute and electric controls.

C. v. Fredersdorff

Pyrometers

Lamm, U. (assigned to Allmanna Svenska Elektriska Aktiebolaget, Vasteras, Sweden) RESISTANCE ELEMENT FOR PYROMETERS. U.S. 2,549,211 (1951) April 17.

Resistance elements for pyrometers for use at very high temperatures may be mounted in ceramic supports such as porcelain, steatite, etc. and covered with suitable glazes. At temperatures as high as 1400 or 1500°C, chemical action of the ceramic or the atmosphere with the noble metals is negligible.

S. Katz

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Harris, F. E. and Nash, L. K. "DETERMINATION OF TRACES OF WATER VAPOR IN GASES." p. 121

Moses, D. V. and Brumbaugh, J. W. "AUTOMATIC GAS ANALYZER." p. 122

Podbielniak, W. J. "PRECISE FRACTIONAL DISTILLATION ANALYSIS." p. 121

Rivers, H. M. "METHOD AND APPARATUS FOR EFFECTING SELF-REGULATED PARTIAL CONDENSATION OF CONDENSIBLE VAPORS." p. 122

12. MATERIALS OF CONSTRUCTION

Cathodic Protection

Kehn, G. R. and Wilhelm, E. J. CURRENT REQUIREMENTS FOR THE CATHODIC PROTECTION OF STEEL IN DILUTE AQUEOUS SOLUTIONS. *Corrosion* **7**, 156-160 (1951) May.

A laboratory method is described for determining the minimum current required for the cathodic protection of steel in water containing a small amount of dissolved solids. This method is essentially a colorimetric analysis of ferric iron.

B. E. Hunt

Parker, M. E. CATHODIC PROTECTION PAYS OFF. *Oil Gas J.* **50**, 144. (1951) May 10. The economic considerations in evaluating cathodic protection systems are illustrated by means of three methods of comparison, (a) side-by-side, (b) off-and-on, and (c) fresh start.

B. E. Hunt

Parker, M. E. CORROSION PROGRAM FOR A PIPE LINE. *Petroleum Engr.*, **23D**, 68, (1951) May.

The careful planning of a corrosion control program is essential if it is to have a maximum efficiency with a minimum cost. The procedures and plans to be followed in both the preconstruction and construction period are outlined. Following the construction period the various tests required by a cathodic protection program are discussed. The various maps and records which should be kept by a corrosion department are described.

B. E. Hunt

Coatings

Huddelston, W. E. COATING FIELD JOINTS AND REPAIRING COATINGS. *Petroleum Engr.*, **23D**, 82-84 (1951) May.

A new device is described for repairing coatings and making field joints. This device consists of a split cylinder of heavy cardboard equipped with sealing gaskets and tie-rings. The cardboard cylinder is connected to the pipe and the enamel is poured into the space between the cardboard and the pipe. The cardboard then acts as a shield for the buried pipe.

B. E. Hunt

Seymour, R. B. THE CHEMICAL RESISTANCE OF PHENOLIC RESINS. *Corrosion*, **7**, 151-155 (1951) May.

Because of their outstanding resistance to solvents, salts and non-oxidizing mineral acids, the coatings, chemical equipment and cements derived from phenolic resins are used widely in the chemical, steel, paper, petroleum, food, textile and plating industries. Practical experience and laboratory test data show phenolic resins to be unsuitable for use in presence of nitric acid, chromic acid or strong alkalies but to be resistant to most other common industrial chemicals at temperatures up to 375° F.
A test procedure has been developed in which the weight change of phenol-formaldehyde coupons is determined for various time intervals and specific chemical resistance data are tabulated. Installations are cited in which brick joined with phenolic resin cement have been in continuous hot acid service for over ten years.
Author's Abstract

Tolley, G. THE USE OF ETHYL SILICATE IN PROVIDING HEAT-RESISTANT COATINGS OF ALUMINUM ON STEEL. *J. Applied Chem.* (British) **1**, 86-92 (1951) February.

This paper deals with the improvement of the oxidation resistance of aluminum coated steel by the application of partially hydrolyzed ethyl silicate. Previous practice has required special heat treatment of the aluminum coated steel to develop a resistant coating. Laboratory tests indicate that this coating gives good protection to steel used at temperatures up to 950° C.
B. E. Hunt

Corrosion

Delahay, P. A POLAROGRAPHIC METHOD FOR THE CONTINUOUS DETERMINATION OF THE CONSUMPTION OF OXYGEN IN CORROSION TESTS. *Corrosion* **7**, 146-150 (1951) May.

A method is described whereby the consumption of oxygen in corrosion reactions may be measured by means of a polarographic technique. Sample calculations are given. The various factors which cause the rate of oxygen consumption to differ from the corrosion rate are discussed.
B. E. Hunt

Effinger, R. T., Renquist, M. L., Wilson, J. G. and Wachter, A. HYDROGEN ATTACK ON STEEL. *Petroleum Processing* **6**, 500-504 (1951) May.

The results and conclusions derived by Shell Oil Co. from a review of their own and others' experience with hydrogen attack on steel are given. This report is limited to those instances where low carbon stills are attacked and this attack is associated with aqueous solutions and electrolytically produced hydrogen. Environments may be classified as (1) pure H_2S and water, (2) H_2S, water and acids, (3) H_2S, water, cyanides, and ammonia. The design of a hydrogen activity probe is described.
B. E. Hunt

Murray, C. A. and Furth, M. A. CORROSION CUT IN TCC GAS PLANT. *Petroleum Processing* **6**, 504-506 (1951) May.

The experience obtained in a TCC gas plant indicated that extensive corrosion was associated with high water content of the streams. Three methods are given for the removal of this water.
B. E. Hunt

HOW TO AVOID GALVANIC CORROSION. *Steel*, **128**, 82-86 (1951) May 21.

Following a brief discussion of the theory of galvanic corrosion, the various techniques developed to prevent galvanic corrosion in aluminum, magnesium and combined assemblies are discussed.
B. E. Hunt

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Ringer, F. "TAKING CORROSION MEASUREMENTS." p. 130

SERVICE TO READERS

Bibliographies and Literature Searches

The library will prepare bibliographies and make literature searches on a cost basis plus a fixed service charge. A comprehensive statement outlining the problem in detail must be presented with the request.

Photocopies

The library will furnish photostatic or microfilm copies of articles abstracted in GAS ABSTRACTS at cost.

Abstracts on Cards

Copies of any abstract in GAS ABSTRACTS on 5 x 8 cards will be supplied on request.

Periodicals Abstracted for GAS ABSTRACTS

American Gas Association Monthly
American Gas Journal
American Petroleum Institute Quarterly
American Society for Testing Materials Bulletin
Analytica Chemica Acta
Analytical Chemistry
Bituminous Coal Research
Blast Furnace and Steel Plant
British Abstracts
British Coal Utilization Research Association Monthly Bulletin
Butane-Propane News
California Oil World
Canadian Chemistry and Process Industries
Canadian Gas Journal
Canadian Journal of Chemistry
Canadian Journal of Physics
Canadian Journal of Technology
Ceramic Age
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemical Engineering Progress
Chemical Industries Week
Chemical Reviews
Chemistry and Industry
Coal Age
Coal Heat
Coke and Gas
Combustion
Compressed Air
Construction Methods and Equipment
Corrosion
Electronic Engineering
Engineers' Digest
Fuel Abstracts
Fuel in Science and Practice
Fueloil and Oil Heat
Gas
Gas Age
Gas and Oil Power
Gas Heat in Industry
Gas Journal
Gas Research Board Publications
Gas Times
Gas World
Heating and Ventilating
Heating, Piping and Air Conditioning
Independent Petroleum Association of America Monthly
Industrial and Engineering Chemistry
Industrial Gas
Industrial Heating
Institution of Gas Engineers: Bulletins, Communications and Transactions
Instruments
Iron Age
Journal of the American Chemical Society
Journal of Applied Chemistry
Journal of Applied Mechanics
Journal of Applied Physics
Journal of Chemical Education
Journal of Chemical Physics
Journal of the Chemical Society (London)
Journal of the Institute of Fuel
Journal of the Institute of Petroleum
Journal of Metals
Journal of the Optical Society of America
Journal of Organic Chemistry
Journal of Petroleum Technology
Journal of Physical and Colloid Chemistry
Journal of Research National Bureau of Standards
Journal of Scientific Instruments and Physics in Industry
Journal of Southern Research
LP Gas
Materials and Methods
Mechanical Engineering
Mining Engineering
National Gas Bulletin of Australia
National Petroleum News
Nature
Nucleonics
Official Gazette of the U.S. Patent Office
Oil and Gas Journal
Petroleum
Petroleum Engineer
Petroleum Processing
Petroleum Refiner
Physics Today
Pipe Line News
Power
Power Engineering
Proceedings of the Institute of Radio Engineers
Public Utilities Fortnightly
Refrigerating Engineering
Review of Scientific Instruments
Science
Southern Power and Industry
Steel
Transactions American Society of Mechanical Engineers
Transactions of the Faraday Society
U.S. Bureau of Mines Bulletins, Information Circulars Reports of Investigations and Technical Papers
World Oil